



UNIVERSIDADE ESTADUAL DE CAMPINAS
INSTITUTO DE ECONOMIA

TEMIDAYO JAMES ARANSIOLA

**“Determinants, Dynamic and Consequence of Child Labor
in Brazil”**

**(Determinantes, Dinâmica e Consequência de Trabalho
Infantil no Brasil)**

Campinas
Fevereiro de 2017



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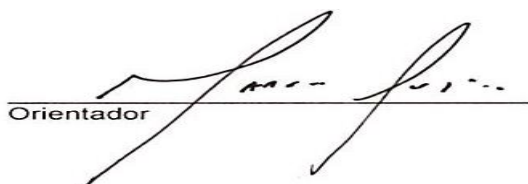
**“Determinants, Dynamic and Consequence of Child Labor
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Infantil no Brasil)**

Prof. Dr. Marcelo Justus dos Santos – orientador

Dissertação de Mestrado apresentada ao Programa de Pós-Graduação em Desenvolvimento Econômico do Instituto de Economia da Universidade Estadual de Campinas para obtenção do título de Mestre em Desenvolvimento Econômico, área de concentração: Economia Social e do Trabalho.

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Defendida em 21/02/2017

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A Ata de Defesa, assinada pelos membros da Comissão Examinadora, consta no processo de vida acadêmica do aluno.

Abstract

This master's thesis is divided in four independent articles. The main objective is to fill some of the gaps concerning the determinants, dynamic and consequence of child labor in Brazil. In the first essay, we explore the cultural-historical concept of child labor as a natural phenomenon in Brazil. For this, we review the literature concerning the history of child labor, focusing on its social and constitutional concepts. The main conclusion from the first paper is that the concept of child labor as natural, i.e., part of the development and education of children, inclusively to deviate them from delinquency, was historically rooted and continues present in the mentality of the Brazilian society. In the second essay, we investigate the determinants of child labor rate in Brazil, emphasizing the role of the *Bolsa Família* program and the Labor Inspection conducted by the Ministry of Labor. For this, data from 2004–2009 and 2011–2014 PNADs of the 27 federation units were used to estimate panel data models. In this second essay, we found no conclusive empirical evidence which permits to sustain the hypothesis that the *Bolsa Família* program and the Labor Inspection contributed to reduce child labor. In the third article, we investigated the probability of intergenerational persistence of child labor so as to find the point at which the risk of transmission of child labor among two generations of the same family turns minimum. For this, we used a pooled sample of 2004 to 2014 PNAD data to estimate probit models. In this article, we found evidence which corroborates previous literature about the existence of *child labor trap* in Brazil. Particularly, the risk of child labor in a generation has negative and nonlinear relationship with the age at which parents started working. In the fourth essay, also using probit regressions, we empirically analyzed the relationship between child labor and mental depression using 2008 PNAD data and its special supplement concerning health. In this last essay, we found the first empirical evidence regarding a positive relationship between work during childhood and mental depression during adulthood.

Key words: Child labor; *Bolsa Família*; Labor Inspection; Intergenerational persistence; Mental depression.

Resumo

Esta dissertação é dividida em quatro artigos independentes. O principal objetivo é preencher certas lacunas a respeito de determinantes, dinâmica e consequência de trabalho infantil no Brasil. No primeiro ensaio, busca-se explorar o conceito de trabalho infantil como um fenômeno natural no Brasil. Nesse intuito, é revisada a literatura sobre a história do trabalho infantil, focando em seus conceitos sociais e constitucionais. A principal conclusão desse ensaio é de que o conceito de trabalho infantil como natural, ou seja, parte do desenvolvimento e aprendizado da criança, inclusive afastando-a da delinquência, foi historicamente enraizado e continua presente na mentalidade da sociedade brasileira. No segundo ensaio, investigam-se os determinantes da taxa de trabalho infantil no Brasil, ressaltando o impacto do programa Bolsa Família e da fiscalização realizada pelo Ministério do Trabalho. Utilizaram-se dados das PNADs 2004-2009 e 2011-2014 para a estimação de um modelo de dados em painel construído para as 27 unidades federativas. Nesse segundo ensaio, não encontrou-se evidência empírica conclusiva que permita sustentar a hipótese de que o programa Bolsa Família e a fiscalização do trabalho contribuíram para a redução do trabalho infantil. No terceiro estudo, é investigada a persistência intergeracional do trabalho infantil, com o intuito de encontrar o ponto no qual o risco de transmissão de trabalho infantil entre duas gerações da mesma família torna-se mínimo. Foram utilizados dados empilhados das PNADs 2004-2009 e 2011-2014 para estimar modelos *probit*. Nesse estudo, encontrou-se evidência que corrobora a literatura prévia sobre a existência da armadilha de trabalho infantil no Brasil. Especificamente, o risco de trabalho infantil numa geração possui relação negativa e não linear com a idade em que os pais começaram a trabalhar. No último ensaio, também por meio de regressões *probit*, é analisada a relação empírica entre trabalho infantil e depressão mental, utilizando dados da PNAD 2008 e de seu suplemento especial sobre saúde. Nesse último artigo, encontrou-se evidência inédita sobre a relação positiva entre trabalho na infância ou juventude e depressão mental na fase adulta da vida.

Palavras-chave: Trabalho infantil; Bolsa Família; Fiscalização de trabalho; Persistência intergeracional; Depressão mental.

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“The reason why child labor policy turns out to be intricate is because of the somewhat unusual factors that cause child labor in the first place.”

Kaushik Basu (2005)

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Lists of Acronyms and Technical Terms

Acronyms

CCT Conditional Cash Transfer

CONAETI National Commission for Eradication of Child Labor

FE Fixed Effect

FUNABEM National Foundation for the Welfare of Minors

GMM System Dynamic Panel-Data estimator

IBGE Brazilian Institute of Geography and Statistics

ILO International Labor Organization

LR Likelihood Ratio

MDE Ministry of Labor and Development

MTE Ministry of Labor and Employment

OLS Ordinary Least Square

PBF *Bolsa Família* Program

PEC Proposal of Constitutional Amendment

PETI Program for Elimination of Child Labor

PNAD National Household Sample Survey

RE Random Effect

SIT Secretariat of Labor Inspection

SITI Information System of Child Labor

SRTE Regional Superintendency of Labor Employment

WHO World Health Organization

Technical Terms

Child labor trap: Intergenerational persistence of child labor

Hard core of child labor: A state at which child labor stops being responsive to governmental measures.

Luxury axiom: Condition by which households only send its children to work if only if income does not cover necessary expenses for subsistence.

Substitution axiom: Condition by which child labor is a perfect substitution of adult labor corrected by an adult-equivalent scale coefficient.

Tipping point: A point at which a vicious cycle turns virtual, and vice versa.

Trapped children: Children who work and have parents who were child laborers, i.e, those stuck in the child labor cycle.

Unobservables: Factors which are non-measurable such as, for example, culture, belief, expectation, etc.

Untrapped children: Children who work and have parents who were not child laborers, i.e, those not stuck in the child labor cycle.

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1 Introduction

Child labor is approached differently in every country due to the divergence of its definition (EDMONDS, 2008). Generally, child labor is referred to as the participation of children in labor activities, which are considered harmful, before a certain stipulated age.

According to ILO, child work is referred to as any activity in which a child is engaged, which can be categorized as light work or child labor. Having that work is prohibited for children under the age of 12, the ILO defines light work as any work exercised by children between age 12 and 14, which does not affect their health, personal development or interfere with their schooling. Such activity is considered positive, however children can only participate in such activities for at least 14 hours per week.

Child labor is a category of work which is considered negative for it deprives individuals of their childhood, potential, education and dignity, besides being harmful to their physical and mental development. In addition, ILO stipulates that the worst forms¹ of child labor involves activities in which children are enslaved, separated from their families, exposed to health hazards or illness or left to fend for themselves on the streets of large cities. In specific, child labor is considered: any form of work for children between age 5–14; any regular work that exceeds 43 hours per week for children below 15 and; any hazardous work or unconditional worst form of work for all children below age 18 (HILOWITZ *et al.*, 2004a).

Brazil ratified Convention 182 concerning the worst forms of child labor on February 2, 2000, and Convention 138 concerning the minimum age for child labor June 28, 2001. Thus, child labor is strictly prohibited for children below age 16 by the Federal Constitution and the Article 60 of the Statute of Children and adolescents. Similarly to the ILO conventions, children above 14 are permitted to exercise light work in the condition of apprenticeship and all children below 18 are prohibited to undertake hazardous activities or unconditional worst forms of child labor. It is however important to highlight that the ILO additionally stipulates that the minimum acceptable age for a child to start work should not be less than the age for completion of compulsory schooling (article 2.2 of Convention 138)².

In line with the ILO and the Brazilian Federal Constitution, child labor is defined in this study as the engagement of children and adolescents from age 5 to 15 in any labor activity, except in the condition of apprenticeship. This definition includes, activities

¹ The worst form of child labor is often classified as hazardous work for specified industries and unconditional worst forms which involves trafficked children, children in forced and bounded labor, armed conflict, prostitution and pornography and illicit activities (HAGEMANN *et al.*, 2006).

² Note that article 2.3 opens breach for countries with insufficiently developed educational facilities.

regarding farming, fishing, livestock, building construction, mining, housekeeping or in any other service, commercial or production establishments for self or household use.

Theoretical and empirical studies concerning the causes, consequences and countermeasures of child labor are widespread in literature. However, there are still questions that remain sparsely investigated. The contribution of this thesis is that it approaches specific issues regarding the economic, sociological and psychological aspects of child labor, which are at stake. For this task, we present four essays – one qualitative and three quantitative.

The first essay presents an historical-cultural analysis of the concept of child labor in Brazil, given special attention to the constitutional and social dimensions. Our postulate here is that the historical development of child labor rooted the mentality of labor as a natural phenomenon even for children and adolescents. In turn, such mentality creates passiveness towards child labor. According to CONAETI (2011) and Rosado e Luciana (2014), such concept hinders the effectiveness of measures which are centered to reduce child labor. Therefore, the comprehension of the origin and logic of such concept is vital for the effective combat against child labor in Brazil.

The second essay sheds more light on the macro-level determinants of child labor. Most empirical studies in Brazil address the causes of child labor using microdata. Such data enables to control for individual and micro-family level variables such as family background (type of family, family size, family income, parent's level of education, etc.) and the individual's personal characteristics (skin color, age, gender, etc.). In short, most empirical evidence concerning these micro-level determinants are in consensus. For this reason, we emphasize the macro-level determinants such as unemployment, urbanization and poverty rate, which can not be addressed using individual data. Thus, focus is on the variability of child labor rates among states.

Most importantly, the aggregation of individual data to state level enables to verify the effect of government policies on the rate of child labor. The policies taken into account are the *Bolsa Família* conditional cash transfer program which was implemented in 2003 and the Labor Inspection with focus on child labor which was first implemented in the states of Minas Gerais and Goiás in 2005 and later adopted in other Brazilian states as from 2006. Hence, this essay contributes to appease political and social debates regarding the effectiveness of these governmental programs.

The third essay contributes to literature concerning the long-run dynamic of child labor. Some studies emphasize the impact of early labor on individual's future earnings. According to these studies, this long-run negative impact is manifested through forgone education during childhood. As noted by Basu (1999), Kassouf (2002), Kassouf (2007) and ILO (2013) a child who works at early age is likely to accumulate less human capital through education compared to that who only study. Low human capital accumulation,

in turn, negatively affects future labor productivity and, consequently, future earnings. We follow a similar direction in the sense that it analyzes the probability of parents who were child laborers to send their children to work at early ages. According to Basu (1999), such family is prone to be trapped in the vicious cycle of poverty and child labor. Aside investigating the child labor cycle, this essay also provides the first empirical evidence of the possibility of halting or reverting the same through the minimum age for work.

The fourth essay contributes to literature concerning the long-run consequence of child labor. Studies such as, for example, Feitosa *et al.* (2001) and ILO (2013) investigated the impact of early labor on child's physical health using injuries or diseases contacted during work as proxies. As upgrade, we allege that the hazardous effect of child labor transcends physical to the mental health of a child laborer. The reason for this is that child laborers, in most cases, face stress, coercion and psychological pressures at too early stages of life. Moreover, in most cases of the worst form of child labor, children and adolescents are also exposed to trauma. According to WHO (2001), childhood stress and trauma, combined with other biological and social factors, are potential determinants of mental depression. Therefore, this essay provides the first empirical evidence concerning the effect of child labor on mental health of individuals.

In short, the main objective of this dissertation is to fill specific gaps concerning economic, sociological and psychological aspects of child labor, which are at stake in Brazil. In specific, in essay one, we seek explore the cultural-historical concept of child labor as a natural phenomenon. In the essay two, we identify the macro-level determinants of child labor and verify the effect of governmental social programs to reduce the child labor rate. In essay three, we investigate the child labor trap and indicate its *tipping point*. Lastly, in essay four, we verify the relationship between child labor and the risk of developing mental depression.

The rest of this master's thesis consist of five chapters. Chapters 2, 3, 4 and 5 present essays one, two, three and four, respectively. In chapter 6, we present concluding remarks and proposals concerning all essays.

2 Cultural-Historical Concept of Child Labor in Brazil

Most studies presuppose that child labor is generally conceived as a negative phenomenon, but we postulate that this is not necessarily always true. According to the National Commission for the Eradication of Child Labor (CONAETI, in Brazilian acronym), the concept of child labor as natural for the development, education and protection of children and adolescents persists in many aspects of the Brazilian society. To CONAETI (2011), the existence of such mentality may restrain the fight child labor. In this essay, we review Brazil historical literature concerning child labor to point out events which indicate the existence of such mentality. Thus, aside presenting the historical development of child labor in Brazil, we examine the cultural-historical concepts which may be shorthanding efforts to reduce child labor in the present. Through our readings in this essay, we found that the concept of child labor as natural was historically rooted and continues present in the mentality of the Brazilian society.

In Brazil, most of the literature concerning the history of child labor only focus on its development over time without addressing. According to (VYGOTSKI, 1994), certain historical events may be deeply internalized and transformed into social and cultural values, which may cause profound transformation of the nature, conception and behavior of individuals. Based on the contribution of this author, we explore the history of child labor in Brazil as a determinant of the foundation for work culture among children and adolescents.

Most studies presuppose that child labor is generally conceived as a negative phenomenon for the development of children and adolescents. In this study, we postulate that such assumption is not necessarily always true and that such biased focus in literature may limit the comprehension of specific issues concerning the causes and persistence of child labor over time.

According to (CONAETI, 2011), the major challenge which the combat of child labor currently faces is that of its “hard core” (*núcleo duro* in Portuguese). This is a state at which child labor is beyond the reach of either public policies or inspection mechanisms, i.e, the reduction of child labor is less responsive in such state. In accordance, the report published by (Repórter Brasil, 2013) and (ROSADO; LUCIANA,

2014) clarified that such situation is observed mostly in family environments, especially in family agriculture, domestic activities and in family commercial establishment.

In this study, although acknowledging the role of socioeconomic factors, we postulate that such core may be as a result of cultural resistance of society and, most especially, families towards the role of work as a means to educate and inclusively protect children and adolescents from delinquency. Specifically, we aim to show that the concept of child labor as a natural phenomenon for the development and protection of young ones was historically rooted and continues present in the Brazilian society.

This essay is structured in five sections, addressing the concepts of child labor in distinct periods. In Section 2.1, we presented the period before the end of the imperialism in Brazil. In Section 2.2, we addressed the period during the republican government. In Section 2.3, we present the period during the New State and military regime. In Section 2.4, we presented the period of political openness and democratization. Section 2.5 provides concluding remarks concerning the concept of child labor as a natural phenomenon in Brazil.

2.1 Child Labor Until the End of Imperial Period – Before 1900

Alike in most countries, the forms and concepts of child labor in Brazil is an historical phenomenon, which significantly evolved over time. The history of childhood in Brazil is usually addressed as from the “discovery” of the country by the Portuguese in year 1500 or as from the beginning of the republican government in year 1900. However, Lage e Rosa (2011) suggest that the history of childhood in Brazil should be treated right from the recruitment of the children who sailed with the Portuguese ship *en route* to Santa Cruz in Brazil. As at then in Portugal, work among children and adolescents was a normal phenomenon in the sense that they were not valued but treated as mere labor suppliers. In other words, little or no concern was expressed regarding the development of children. Ramos (2010) detailed that the recruitment of children, mostly those between the age of 9 and 16, was done by three means: kidnapping of Jewish children in order to control Jewish population in Portugal; enrollment of children from poor families by parents whose objective was to reduce household expenses and; enrollment of homeless orphans. On board, these children were classified in two categories: the cabin and page boys. According to Paganini (2011), the cabin boys were those responsible for the most hazardous and arduous tasks carried out on the ship, while the page boys performed less arduous tasks.

Lage e Rosa (2011) enlightened that the indigenous population who inhabited the Brazilian territory before the arrival of Portuguese ships lived in social groups separated by age and gender. In this society, children were valued and not regarded as mere suppliers

of labor. Specifically, Leite (2011) asserted that children under age 8 were assumed to be maternally dependent. Older male children were presented bows and arrows to play among their peers, while older female children continue with their mothers with the objective of learning how to spin cotton and knead clay. In short, work was considered a means of involving and teaching children the ways of the social group.

This view corroborates that of Kassouf e Justus (2006) who informed that in the pre-harvest period of the woodland areas, children participated alongside with their parents to harvest honey, hunted birds, turtle eggs and other animal products. Despite such activities barely involved employment relationship or implied exploitation of children, they marked the beginning of child labor before the colonial era. This social and cultural child-parent relationship among natives was marveled by the Portuguese explorers at first contact because the indigenous population cared for and valued children and only require them to learn the ways of the social group. However, such non-exploitative relationship did not last long after the arrival of Portuguese.

After the colonization process started in the early 1530s, indigenous children were forced to accompany their parents to work on crop fields. Gradually, the culture and tradition of these indigenous population began to tarnish and the culture of labor among children began to flourish.

The arrival of the Jesuit priests later in 1549 also played fundamental role in rooting the culture of labor as positive and educative into the mentality of the Brazilian indigenous population. According to Chambouleyron (1999), the objectives of the Jesuit priests were to teach the natives, especially children, religious songs, how to read and write and to moralize the value of work. Paganini (2011) and Cunha e Ogliari (2012) concurred that the Jesuit priests successfully implanted the ideology of work as what makes a man good, honest and obedient. In religious terms, these priests created the ideology that work makes humans decent and clears their path to heaven (CUSTÓDIO; VERONESE, 2009).

As at 1550, the first slave ships, which mostly trafficked Africans, arrived in Brazil with the intention of substituting the colonized indigenous labor force. Having that the major objective of slavery was production, there was greater demand of agile adult labor force and, therefore, reproduction among slaves was unwelcome to avoid costs. However, after the extinction of slave trade in 1850, slave masters began to value slaves' children and incentive reproduction. According to Lage e Rosa (2011), the major intention for this was to create more slaves since trade was no longer permitted. As a result, child labor and slavery continued even after the abolition of slave trade.

The decade of 1850 was marked by two significant events concerning child labor: the first decree regarding compulsory education and high incident of child abandonment. Specifically in the year 1854, the decree nº 1.331-A imposed the compulsory age for basic education but instructed that children who suffer from communicable diseases, those who

have not been vaccinated and slaves should not be enrolled in school (SILVA, 2009). This contributed to deepen inequality among poor and rich population. Thusly, most poor children who could not study had to be enrolled as work apprentice. During this period, the abandonment of children by slave mothers who could not financially afford to have a baby became alarming. According to Lage e Rosa (2011), these mothers preferred their babies to be adopted by other parents so that they do not also become slaves.

These authors further added that abandonment was addressed differently in rural and urban areas. While the rural population openheartedly adopted abandoned children so as to increase labor force on crop fields, the urban population frankly rejected these children for being “product” out of wedlock. In fact, women who had babies out of marriage were judged and condemned by the society. Therefore, most women had to abandon their babies to avoid moral condemnation. This situation became quite alarming since there were not enough families to adopt these babies in the urban areas alike in the rural. The aftermath of this is the boom of baby hatches, which are wooden cylinders attached to the walls of welfare institutions. These cylinders have openings to the streets from which mothers can anonymously abandon their children and simply spin the cylinder opening for the institution to adopt the baby. According to Nascimento (2008), Paganini (2011) and Lage e Rosa (2011), the availability of this facility made child abandonment in urban areas easy and spared mothers from social condemnation.

In most cases, these abandoned children were forwarded to hospitals, churches, convents, families or holy houses of mercy. In as much as these institutions try to cater for these children, the alarming increase of the rate of abandonment makes such task difficult. Thus, due to limited resources and rare government support, most of these children did not get adequate care. As a result, the rate of mortality of abandoned children increased expressively (NASCIMENTO, 2008). Moreover, Paganini (2011) added that the children who survived up to the age of 7 were enrolled as apprentice in workshops where their labor is exploited. Kassouf e Justus (2006) pointed that during the 1860s, the Navy – probably the first government organization that exploited child labor – recruited children and adolescents as apprentices and were eventually trained to fight in the Paraguay war which started in 1864. Lage e Rosa (2011) informed that at certain age children from charity institutions were sent out to strive on their own. As a result of extreme poverty most ventured into crime to ensure a living. According to Fonseca (2001) and Paganini (2011), these group of abandoned children were referred to as “minors” to differentiate normal children and transgressors. Along the years, the rate of crime and vandalism by these individuals increased expressively in the urban areas to the extent of creating social, political and economic awareness.

At this point, the Brazilian government admitted that attention needs to be paid to abandoned children in the urban areas not because of their well being, but for the sake

of national security. Parallel to the increasing crime rate during the late XIX century, Brazil was initiating its first experience of industrialization. According to Moura (1999), due to the existing doctrine which regarded work as natural, the emerging industrial sector counted fully on the supply of child labor. In the mid 1870s, announcements were publicly placed for the recruitment of children, especially in the textile sector. As at 1890, children and adolescents were already about 15% of the work force of the textile industry. Although this sector was the major employer, the construction, service and food industries also had their share of this cheap and unregulated labor.

Moura (1999) reported that by the end of the XIX century, most of the charity asylums were already transformed in institutions, professional schools and agricultural employers which could freely exploit child labor force. Thus far, the government had no interest in prohibiting child labor since it serves economical use and equally sweeps delinquents from the streets. Only in 1891, after countless reports of accident at work, did the Brazilian government propose the decree n° 1.313 which aimed to prohibit work for children below 12 in the textile industry, except in the condition of apprenticeship between the age of 8 and 12. However, Silva (2009) clarified that this decree was recurrently breached since most of the migrant and poor children had no birth certificate.

2.2 Child Labor during the Republican Government – 1900 to 1930

The proclamation of the Republic in 1889 brought about severe political and economical changes in Brazil. However, little was altered concerning the situation of children in the society. As per child labor, the early XX century was marked by the creation of the Disciplinary Institute in 1902. According to Fonseca (2001) and Cunha e Ogliari (2012), this institution had the sole objective to correct and regenerate childhood through work and for work. In other words, work was meant to discipline and recreate poor and abandoned children who perambulated the urban streets and were considered, from the political point of view, potential danger to the society. Fonseca (2001) reported that children were separated in this Disciplinary Institute by their physical aptitude and later sent to workshops or crop fields. Besides, these children were responsible for most services which guaranteed the auto-sufficiency of the institute.

To Cunha e Ogliari (2012), the pursue of industrialization during this period made the government to opt for professional education centered to create labor force for the industrial sector. Having this intention, in 1909, the Brazilian president, Nilo Peçanha, ordered the creation of nineteen craftsman schools in the capital of each state. Posteriorly in the 1920s, twenty agricultural institutions were also created in order to overcome the shortage of labor in the agricultural sector. These institutions mainly employed children found in the streets to make them workers of the nation. Thus far, one perceives that ed-

ucation, even during the republican government, was not specifically for the development of children but rather for the creation of labor force.

Silva (2009) added that with intention to address the case of minors the government created the juvenile justice law in 1923, which was later transformed into the Code of minors in 1927 with the publication of the decree nº 17.943. According to this author, this decree is considered the first ever legal protection¹ for children and adolescents in Latin America. This code stipulates that abandoned or delinquent children below age 18 should be referred to social assistance institutions. Thus, with this code, these children stopped being legally considered criminals and were supposed to be “cured” through work. Literarily, the government chose to solve the juvenile delinquency problem with work. Nevertheless, this code prohibited work for children under the age of 12.

2.3 Child Labor during the New State and Military Regime – 1930 to 1979

With the rise of the New State, adjustment were made to the Code of minors in 1932 to address child labor not only for the sake of public security, but also for economic interest. The general minimum age for work was increased to 14, minimum age for night work was stipulated at 16 and insalubrious work was limited to children above age 18. Posteriorly, in the 1934 Federal Constitution, labor was considered not merely as an economic and political issue, but also as a social issue. Subsequently, the Federal Constitution of 1946 made progress and throwback concerning child labor. As for progress, Silva (2009) informed that this Constitution increased the minimum age for night work from 16 to 18. Whereas, as for throwback, (PAGANINI, 2011) informed that the same Constitution empowered Judges to authorize children under 14 to work whenever deemed necessary.

In the early 1960s, there was an increasingly urgent concern about economic development and national security. After the military coup in 1964, this concern intensified and led to the creation of the National Foundation for the Welfare of Minors (FUNABEM, in Brazilian acronym) and its respective state headquarters named FEBEM – State Foundation for the Welfare of Minors. These institutes had similar objectives to that of the Disciplinary Institute in the sense that they seek to reprimand, correct and integrate deviant “minors”, who were considered as threat to the security of the nation. According to Lage e Rosa (2011), as always, the government had no intention to protect these children but was only worried about “sweeping the bad apples”.

Still during the military government, further throwbacks were observed concerning child labor. Firstly, the government, through the Act 158 X of the Federal Constitution of

¹ Protection in the sense that cases concerning children and adolescents were treated outside the penal code. (PAGANINI, 2011)

1967, reduced the minimum age for work from 14 to 12. This solely contributed to mask the rate of child labor at the moment. In 1979, the government presented the second Code of minors, which reinstated the culture of work and legitimated all sort of exploitation of child labor irrespective of age. Paganini (2011) further added that this code made no mention of the difference between poor children, delinquent children and transgressors. Therefore, the exploitation and segregation of vulnerable children and adolescents was made easy.

2.4 Child Labor during Political Openness and Democratization – As from 1980

In the early 1980s, Brazil began to adopt numerous open door policies. Fortunately, this political openness came along with benefits to childhood in Brazil as a result of the ongoing movements by international organizations such as the UNICEF to protect children and the ILO to regulate work in general. With concern about its image abroad, Brazil gradually started to ratify international norms and standards, inclusively those concerning reduction of child labor (CONAETI, 2011).

As aftermath, differently from previous Constitutions, the Federal Constitution of year 1988 (in vigor) treats labor exclusively as a social issue. Moreover, this current Constitution presents legal and social rights, privileges of children, prioritizes education and abandons the concept of work as “cure” to delinquency. Specifically, article 227 of this Constitution disposes right to education, health, work, social security, protection of maternity and childhood, and assistance to the destitute. In other words, children and adolescents are now recognized as bearer of fundamental right and not as mere object.

As per definition of child labor, the 1988 Federal Constitution sets the minimum age for work at 14 but permits work as apprentice as from the age of 12. In 1998, the Constitution was amended and the minimum age for work, likewise the age for apprenticeship were increased to 16 and 14, respectively. In addition, work was prohibited in insalubrious environments for individuals below the age of 18.

Progress were observed concerning the fight against child labor in subsequent years such as the creation of the Program for the Eradication of Child labor (PETI, in Brazilian acronym) in 1996, the ratification of the ILO Convention 182 regarding the worst forms of child labor in 2000 and the ratification of the Convention 138 concerning the minimum age for work in 2001. The creation of PETI marked the first governmental social program strictly focused on the combat of child labor. In this program, families receive a certain amount of money conditioned to the withdrawal of children under 16 from work, enrollment and attendance of the children in school. Besides, Brazil has constantly updated the list of the worst forms of child labor, which are prioritized in majority of the social

programs to combat child labor.

Despite acknowledging the significant progress marked by the current Constitution, Lage e Rosa (2011) argued that these changes were mere result of international pressure due to adopted open door policies. This argument, however, seems reasonable in the sense that all definitions and stipulations regarding child labor are those extracted from international laws. In this context, these authors defend that certain Laws are clearly distant from the Brazilian reality. Loosely speaking, the foreign Laws adopted in Brazil have the objective of creating a culture in the society, whereas the same Law in its country of origin has the objective to regulate an already existing culture. If this is true, the question we ask is: what happened to the concept of work as dignifying, educative or “cure” to delinquency and vandalism in children and adolescents?

2.5 Concluding Remarks

It will be too negligent to think that the mere implementation of the 1988 Federal Constitution completely eroded the cultural and ideological concept of child labor which have been historically rooted in the mentality of the population.

There are several of debates regarding the stipulated minimum age for work in Brazil. On the one hand, those who are in support of the reduction of this age, which are not few, conserve the dogma of child labor as educative or “cure” to delinquency. On the other hand, others believe that the minimum age still has to be increased to avoid side effect on future income, health and to avoid intergenerational persistence of poverty and child labor. First, regarding the increase, studies such as that of Silva (2009) and Oliva (2013) debated that according to the ILO Convention 138, which Brazil ratified, the minimum age has to be 18. These authors justified that since the same ILO Convention stipulates that the minimum age for work (currently 16, in Brazil) should not coincide with the age for compulsory education (currently 4–17, in Brazil), the minimum age has to be increased to, at least, 18. Justus *et al.* (2015) also supported similar argument through empirical evidence which concludes that the best age to enter the labor market is far beyond the age of 16.

Regarding the reduction of the minimum age for work, most of the claims are defended through political debates and Proposal of Constitutional Amendments (PEC, in Brazilian acronym). Recently, three PECs were submitted by deputies suggesting the reduction of the minimum age for work from 16 to 14. Specifically, the PEC 18/2011 was presented by deputy Dilceu Sperafico, PEC 35/2011 by deputy Onofre Agostini and PEC 274/2013 by deputy Edinho Bez (Congresso em Foco, 2015)². All these PECs were

² The *Congresso em Foco* (Congress in focus, in English) is a journalistic site which covers facts and information, specifically, from the Brazilian National Congress.

revitalized for discussion in February of year 2016. According to Deputy Dilceu Sperafico, this proposal amplifies the rights of children in the sense that it formalizes the work of those who really need to work and guarantee them labor and security rights. In consensus, Deputy Onofre Agostini affirmed that if a child is regularly enrolled in school and is being adequately followed up, work will bring benefits in the sense that it creates income for the family and counts positively to his moral and educational formation. On the same grounds, Deputy Edinho Bez considered work educative for individuals and also reminded that “an empty mind is a devil’s workshop”. These processes continued in juridical analysis until October 4, 2016, with the final review of Deputy Betinho Gomes, which deemed the PECs as inadmissible.

At this point, it is clear that the concept of work as natural for children and adolescents has always been present for centuries of Brazilian history. Although our literature review so far focused on the constitutional dimension, the preeminence of such concept is also very much present in the social dimension. The reason for our asymmetric focus is due to the dearth of documented information concerning the social dimension of the concept of child labor compared to the constitutional dimension. However, recent studies have made attempts to fill this gap.

Majority of the studies which addressed the social dimension of the concept of child labor in Brazil focus on families. Feitosa e Dimenstein (2004) embarked on this course with the intention of discussing the perception of mothers concerning child labor. These authors interview mothers of child laborers in the Northeast region of Brazil. Findings showed that mothers worry concerning the idleness of their children after school. To these mothers, such free time makes children vulnerable to negative influences from other children. Specifically, occupying children’s time with work becomes a way to protect them from becoming criminals, vagabonds or even drug users. In short, the mothers interview by these authors firmly qualified child labor as a positive phenomenon for the protection and development of their children. However, these parents clarified that child labor is not considered a substitute for education, but for idleness, i.e time after school.

In line with these authors, Almeida e Lima (2010) defended that not only financial necessity lure children and adolescents to work at tender age, but also the cultural and ideological nature of their family environment. To support this argument, these authors investigated mothers, who were child laborers, and their children in the Southeast region of Brazil so as to know the concept of both concerning child labor. Aside affirming mothers’ view concerning how work protects children from negative influences, these authors also observed significant divergence between children’s and mothers’ concept of child labor.

Specifically, on the one hand, children conceive work as help to their parents or as a means of achieving financial independence. On the other hand, mothers consider work as a way to teach children how to strive in life since the future through academics

is uncertain, unpredictable and uncontrollable. Curiously enough, these authors pointed that such concept is most adopted by mothers who were not child laborers. Analogously to previous authors, Marin *et al.* (2012) and Marchi (2013) interviewed children and parents from the Southern region of Brazil. Their findings were similar to those from previous authors in the sense that work is conceived as a medium to meet family needs and to educate children for the future.

Another social characteristic which may be contributing to root the culture of child labor nowadays is the alarming increase of consumerism among children and adolescents. According to Lage e Rosa (2011), the generalization of consumerism in children and adolescents pressure, most especially, those from poor household who cannot afford to keep up to such standards. In such circumstance, the combination of passiveness from the constitutional and social dimensions together with generalized consumerism among children and adolescents is most likely to sprout unnecessary child labor as those reported in the publication of Repórter Brasil (2013). In the report, specialists informed that some children of nowadays enter the labor market not to support family income, but to acquire material items such as, for example, video games, music players, mobile phones and branded cloths. Such observation is buttressed by (GONÇALVES *et al.*, 2012a), who conducted a field research interviewing 962 adolescents between age 14 and 15 who resided in the Southern region of Brazil. These authors found that only about 18% of these adolescents declared to work to support family income, whereas almost 79% worked for self interest.

At this point, we notice the 1988 Federal Constitution engendered abandonment of the concept of child labor as natural for the development, education and protection of children and adolescents in the constitutional dimension. However, such concept continues preserved in the social dimension, causing passiveness of society towards child labor. Such passiveness is prone to perpetuate child labor and also limit the effectiveness of measures aimed at reducing the same.

3 Conditional Cash Transfer, Labor Inspection and Child Labor

Empirical studies concerning the determinants of child labor are widespread and consolidated in literature. However most emphasize the role of individual or family-level factors. In contribution, we allege and empirically test the hypothesis that society-level factors also play key roles in determining the rate of child labor in Brazil. The main focus of this essay is to investigate if the *Bolsa Família* conditional cash transfer and the Labor Inspection contributed to reduce the rate of child labor. Alongside, we verify the role of other important factors such as: poverty, unemployment, urbanization and proportion of children and adolescents enrolled in school. For this purpose, we aggregate individual data from 2004 to 2014 PNAD to state level and adopted panel data models. Empirical results found does not permit to sustain the hypothesis that the *Bolsa Família* program and the Labor Inspection contributed to reduce child labor rate in Brazil.

Article 60 of the Brazilian statute for children and adolescents, recognized in Law nº 8069 of the Federal Constitution, prohibits any labor activity to minors under the age of 16, except in the condition of apprenticeship as from the age of 14. Still in 2014, there were about 3,3 million child laborers between age 5 and 17 in Brazil (IBGE-PNAD, 2014). Specifically, about 2% of this total were between age 5 and 9, about 25% between age 10 and 14, and about 73% between age 15 and 17. Despite the remarkable achievements of the Brazilian government concerning the combat of child labor over time, these numbers are still alarming. Thus, the contribution of studies concerning the potential determinants of child labor continue vital.

Empirical studies concerning determinants of child labor is widespread in Brazilian literature. However, majority use individual data to investigate factors that lead children and adolescents to work. Such approach permits to account for the effect of individual and family specific factors such as, for example, skin color, gender, family income, parent's level of education, family structure, etc (KASSOUF, 2001; SCHWARTZMAN; SCHWARTZMAN, 2001; CACCIAMALI; TATEI, 2008; KASSOUF; JUSTUS, 2010; AQUINO *et al.*, 2010). Nevertheless, these studies do not account for relevant macro-level determinants of child labor rate such as, for example, income inequality, urbanization, poverty and unemployment, etc.

The only empirical study which sought to explain the rate of child labor in Brazil is that of Ramalho e Mesquita (2013). These authors used a panel data of Brazilian states over the period of 2001 to 2009. Although the main objective of the study was to investigate the determinants of child labor rate in urban Brazilian states, greater attention was given to temporal dynamics and informality. Notwithstanding the contribution in these aspects, these authors omitted several relevant macro-level determinants of child labor rate such as urbanization, unemployment rate and the proportion of children enrolled in schools. Moreover, the only factor treated as endogenous during model specification was family income, leaving out the *Bolsa Família* program. This program is endogenous since participation in the program is conditioned to the nonexistence of child laborers in the family. Thus, the omission of relevant factors and the negligence of potential endogeneity makes estimates inconsistent.

Therefore, the contribution of this essay towards the study of Ramalho e Mesquita (2013) is that it controls additional macro-level factors which has been deemed relevant by theoretical studies. Moreover, on this course we measure the impact of governmental social programs in combating child labor. Furthermore, we account for endogeneity using appropriate methods.

In short, the main objective here is to investigate the effect of the *Bolsa Família* conditional cash transfer program (henceforth, PBF) and Labor Inspection on the rate of child labor among Brazilian states. Concerning this objective, we put forward the hypothesis that both measures contributed to reduce child labor rate from 2004 to 2014. On the one hand, the PBF program ease financial strain of poor families, conditioning them to enroll their children in school. On the other hand, the Labor Inspection withdraw children from work, gives them social assistance and also fines exploiters of the labor of children and adolescents.

As to the structure of this essay, Section 3.1 and 3.2 present reviews of theoretical studies and previous evidences. Section 3.3 presents the empirical strategy and procedure. Finally, Section 3.5 provides the descriptive analysis and results.

3.1 Theoretical Background

The attention aroused during the industrial revolution by the excessive use of child labor in factories gave origin to the first insights concerning child labor. According to Basu (1999), the main theoretical frameworks during the XVIII century were that of Karl Marx, Alfred Marshall and Arthur Pigou.

Marx focused on the causes of child labor emphasizing the relationship between the rise of a new technology (referring to machinery) and the demand of special work force – labor of women and children. In his words:

“We consider the tendency of modern industry to make children and juvenile persons of both sexes co-operate in the great work of social production, as a progressive, sound and legitimate tendency, although under capital it was distorted into an abomination. In a rational state of society every child whatever, from the age of 9 years, ought to become a productive labourer in the same way that no able-bodied adult person ought to be exempted from the general law of nature, viz.: to work in order to be able to eat, and work not only with the brain but with the hands too.” (KARL MARX, *Instructions for the Delegates of the Provisional General Council*, 1866).

To Marx’s point of view, the arrival of machinery depreciated labor power in the sense that machines reduce the number of work force and time necessary for activities in factories. As a result, adult wage was depressed, and families whose income was forced below subsistence level were compelled to put their children to work (MARX, 1967). In other words, Marx concludes that the arrival of new technology initially diminishes the demand of adult labor and, eventually, depresses wage, which in turn may lead to the supply of child labor.

Marshall, addressed the consequences of child labor, emphasizing the role of investment in human capital. In his words:

“the less fully their own [adults] faculties are developed, the less will they realize the importance of developing the best faculties of their children, and the less will be their power of doing so. And conversely any change that awards to the workers of one generation better earnings, together with better opportunities of developing their best qualities, will increase the material and moral advantages which they have the power to offer to their children.” (MARSHALL, 1895)

At this point, Marshall was clearly shedding light on the dynamics and intergenerational persistence of child labor and the capacity of education to revert poverty cycle.

In accordance with Marx and Marshall, Pigou acknowledged that ban of child labor is benign. Therefore, such policy should be combined with social welfare programs to relieve poor families of the opportunity cost burden incurred due to investment in child’s human capital. In fact, these authors argued that the externality accrued from education is positive and worthwhile.

The contribution of these early writers set foundation on which later writers developed formal theoretical frameworks of household behavior. According to Basu (1999), these theories either adopt the *unitary model* or the *collective model*. In the former, the household is treated as a single-decision unit, i.e, an altruistic member makes makes all

decisions on behalf of the other members. Contemporary studies adopt *collective model*, which account for internal bargains and power struggle within the family. Using this approach, some studies investigate the determinants of child labor, focusing on decisions made within the family – intra-household bargaining. However, some others focus on the bargain between the employer and the child’s parent – extra-household bargaining.

Moehling (1995) adopted the intra-household bargaining model in which the household is composed of two agents: agent 1 and agent 2, a parent and a child, respectively. It was assumed that there is only one consumption good x_i in the economy, which satisfies each unit of utility, u_i , of agent i and that each agent cares about the other. Thus, the household’s average utility depends on the income of both the parents and child, y_1 and y_2 respectively. Therefore, the household decision can be represented as follows

$$\begin{aligned} \max_{(x_1, x_2)} \quad & \alpha(y_1, y_2)u_1(x_1, x_2) + [1 - \alpha(y_1, y_2)]u_2(x_1, x_2) \\ \text{subject to} \quad & x_1 + x_2 \leq y_1 + y_2 \end{aligned} \quad (3.1)$$

assuming that

$$\frac{\partial \alpha}{\partial y_1} \geq 0, \frac{\partial \alpha}{\partial y_2} \leq 0, \frac{\partial u_1}{\partial x_1} > 0, \frac{\partial u_1}{\partial x_2} \geq 0, \frac{\partial u_2}{\partial x_1} \geq 0, \frac{\partial u_2}{\partial x_2} > 0 \quad \text{and} \quad 0 \leq \alpha \leq 1 \quad (3.2)$$

Furthermore, it is assumed that the child either work or play. Thus, this model can be further sophisticated by including child’s leisure, which is represented by $1 - e$, having that e denotes time spent on work by the child. In this case, the household’s collective decision problem is

$$\begin{aligned} \max_{(x_1, x_2)} \quad & \alpha(y_1, y_2)u_1(x_1, x_2, e) + [1 - \alpha(y_1, y_2)]u_2(x_1, x_2) \\ \text{subject to} \quad & x_1 + x_2 \leq y_1 + y_2 \end{aligned} \quad (3.3)$$

According to Basu (1999), the challenge faced by the family in this case is the choice of e , which determines the level of income the child contributes to the family. The author suggested to consider y_2 exogenous and suppose that both agents, parent and child, are selfish in order to find the household’s equilibrium. In so doing, conclusion was drawn that the “optimum” child labor depends on the labor market value of adult wage and child wage.

Unlike Moehling (1995), Gupta (2000) adopted an extra-household bargaining model. In this case, the bargaining occurs between a greedy employer and a selfish parent concerning the child’s wage, w , and part of this wage that should be paid in form of food to the child, λ . Gupta (2000) also assumed that the productivity of a child is related to its feeding in a non-linear form and has a fixed minimum negotiated between the parent and employer. Hence, the output of the child’s work is given by

$$x = x(\lambda w) \quad \text{where} \quad x'(\lambda w) > 0, \quad \text{and} \quad x''(\lambda w) < 0 \quad (3.4)$$

Supposing that parents and employer reach a settle point (w, λ) and they earn Y_P and Y_E respectively, the Nash bargaining problem is solved by:

$$\max_{(w, \lambda)} [(1 - \lambda)w - Y_P][x(\lambda w) - w - Y_E] \quad (3.5)$$

Compared to the model presented by Moehling (1995), one can clearly observe the sharp contrast of the assumptions made in Gupta (2000) concerning the relationship between parents and children. However, these two authors converge in the sense of finding a single and static equilibrium.

Basu (1999) argued that previous studies overlooked the possibility of multiple equilibrium in a labor market setting where children work. This author also added that the assumptions made in previous studies concerning parent's selfishness is too extremist and, to a certain point, unrealistic since parents only send to send their children to work for reason of survival. This observation gave origin to the *luxury axiom* which assumes that a household will send children to work only if income from adults does not cover for the necessary expenses for subsistence. In other words, the child's leisure is a luxury good for extremely poor families. In short, this axiom reinforce the role of poverty in the household supply of child labor.

To construct the supply function of child labor, Basu e Van (1998) assumes that there are N identical households which consist of an adult and a child. In this setting, adults work independently of wage level, but children only work to support family income. Thus, the household's preference (\succ) is

$$\{(c, e) | c \geq 0, e \in \{0, 1\}\} \quad (3.6)$$

where c and e are family consumption and child's work effort, respectively. Given the *luxury axiom*, the household's problem is to solve the following budget constraint, represented as

$$\max_{(c, e)} 2c \leq ew_C + w_A \quad (3.7)$$

where w_A is adult's income, s is subsistence level and w_C is the level of wage which the child has to earn to bolster household's income to meet a minimum subsistence level of consumption¹. The solution to the maximization problem is

$$c(w_A) = \begin{cases} w_A/2 & \text{if } w_A \geq 2s \\ \frac{w_A + w_C}{2} & \text{if } w_A < 2s \end{cases} \quad (3.8)$$

$$e(w_A) = \begin{cases} 0, & \text{if } w_A \geq 2s \\ 1, & \text{if } w_A < 2s \end{cases} \quad (3.9)$$

¹ Note that since wage levels are being compared to family *subsistence level*, the implicit definition of poverty here is the capacity to family income to meet *basic* needs.

and the labor supply function of adults (S^A) and children (S^C) are

$$\begin{aligned} S^A &= N \\ S^C(w_A) &= \begin{cases} 0, & \text{if } w_A \geq 2s \\ N, & \text{if } w_A < 2s \end{cases} \end{aligned} \quad (3.10)$$

Together with the *luxury axiom*, Basu e Van (1998) proposed the *substitution axiom* which assumes that adult labor is a perfect substitute to child labor. However, the unit of child labor must be corrected by an adult-equivalent scale coefficient, γ , which varies from 0 to 1. This assumption was necessary to derive the aggregate demand of child labor.

Assuming that there are n firms in the economy producing a single good. The total output of each firm i is

$$x_i = f(A_i + \gamma C_i), \quad f' > 0, \quad f'' < 0, \quad (3.11)$$

where A_i and C_i denote the number of adult and child workers in the firm, respectively. Hence, the profit-maximizing problem faced by the firm is given by

$$\max_{(A_i, C_i)} f(A_i + \gamma C_i) - A_i w_A - C_i w_C \quad (3.12)$$

Having that $\frac{w_C}{\gamma}$ is the child wage per adult-equivalent practiced in the labor market, the solution of this problem implies that if $w_A < \frac{w_C}{\gamma}$ firm employs only adult, but if $w_A > \frac{w_C}{\gamma}$ children are employed. However, the firm deems indifferent to employ adult or children if $w_A = \frac{w_C}{\gamma}$. In a case where the firm opts for a combination of adult and child wage that minimizes w_A and w_C , the aggregate demand for adult and child labor in the economy is given by $nA_i + n\gamma C_i$.

Having the aggregate supply and demand function of child labor at optimal wage levels for adult (w_A^*) and children (w_C^*), the equilibrium points of this labor market is attained at

$$\begin{aligned} D^A(w_A^*, w_C^*) &= N \\ D^C(w_A^*, w_C^*) &= S^C(w_A^*) \end{aligned} \quad (3.13)$$

In Fig. 1, Basu (1999) illustrates a simplified version of the general model from Basu e Van (1998). The vertical axis represents adult wage level which determines if household will send its children to work or not. On the horizontal axis which represents total labor supply, A' is the total supply of adult labor and T is the total effective labor that children can supply. If there are X children in the economy, the distance from A' to T is γX which represents the aggregate potential supply of child labor.

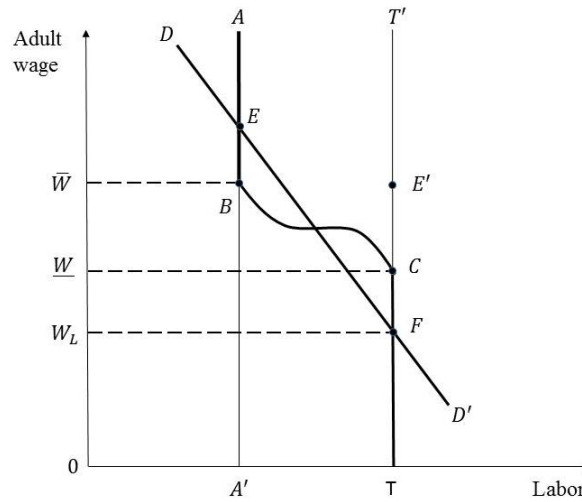


Figure 1 – Supply and demand of child labor
Source: Basu (1999)

Supposing that the market adult wage is below \bar{W} , all children are sent to work to support household income to reach the subsistence level and aggregate labor supply is $0T$. At this point, adults and children earn W_L and γW_L , respectively. Though, if adult wage is set above \bar{W} , no child is sent to work and aggregate labor supply is $0A'$. The slope between B and C indicates that household responds to increase in W by withdrawing children from the labor market one after the other, vice versa. Thus, the total potential labor supply in the economy is represented by the curve $ABCT$, which Basu (1999) denominated *hybrid supply curve*.

This intersection of the hybrid supply curve with the aggregate demand curve represented by DD' clearly illustrates the multiple equilibria observed by Basu e Van (1998). Specifically, this theoretical model indicates two stable equilibria (E and F) and an unstable one (between B and C). Basu (1999) argued that the same economy may finds itself on point E where adult wage is high and no child work (good equilibrium) or on point F where adult wage is low and all children work (bad equilibrium). Basu e Van (1998) suggested the banning of child labor may make the economy to calibrate from point F to E . However, such policy is prone to become dormant after the economy reaches point E . Basu (1999) added that point E' is irrelevant because E is superior to E' which is preferred to F by the household. In other words, if the household adult income exceeds \bar{W} , there is no reason for children to be sent to work.

The theoretical model developed by Basu e Van (1998) was further complemented by Basu (1999) to include the effect of adult unemployment. This author argued that the relationship between child labor and unemployment is prone to be ambiguous in a competitive labor market. On the one hand, increase in adult's wage may lead to reduction of child labor as response to the increase in adult's household income. On the other hand, a rise in adult's wage lead to increase in unemployment rate of adults, which is followed

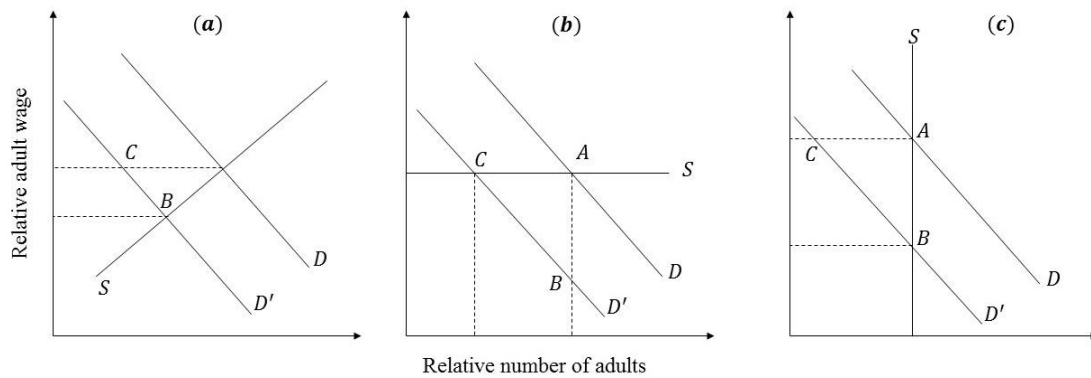


Figure 2 – Child labor and adult labor market
Source: Galli (2001)

by higher demand of child labor by firms (since adults and children are substitute subject to equivalency correction). In this case, firm's demand will meet household supply of child labor, since households will seek to compensate depressed adult income.

Galli (2001), in line with Basu (1999) discusses the relationship between child labor and adult unemployment. Acknowledging that children are only substitute to unskilled adult labor subjected to equivalency correction, this author shows that exogenous shocks in supply of child labor may provoke different reactions to adult wage, given the level of flexibility of unskilled adult labor market.

In Fig. 2, graph (a), Galli (2001) portrays that exogenous increase in child labor reduce demand of unskilled adult labor causing dislocation of demand curve from D to D' , given the assumption that firms would rather hire children for being cheaper and less regulated. Moreover, graph (a) also illustrates that the wage of unskilled adults is also reduced. In graph (b) and (c), the author considered infinitely elastic and inelastic supply of adult unskilled labor. As to case (b) which illustrate labor market with adult minimum wage, exogenous increase in child labor supply cause reduction of unskilled adult labor demand without changes in wage. However, in case (c) demand of unskilled adult labor remains unaltered but wage is reduced.

Now we shift to theoretical models of the effect of governmental countermeasures on child labor. Das e Deb (2006) elaborated an infinite-horizon dynamic model of child labor considering a variable rate of time preference and credit constraints. An interesting feature of this model, aside pointing the effect of credit, is that it addresses the effects of some countermeasures against child labor in a dynamic horizon. The countermeasures considered by these authors are: enrollment subsidy, increase in adult wage, improvement in primary education infrastructure and lump-sum subsidy.

The construct of the basic model is focused on a household with two agents: a parent and a child. These agents derive instantaneous utility, u_t , from consumption, c_t . The child is assumed to either work, l_t , or study, $1 - l_t$, while the parent always

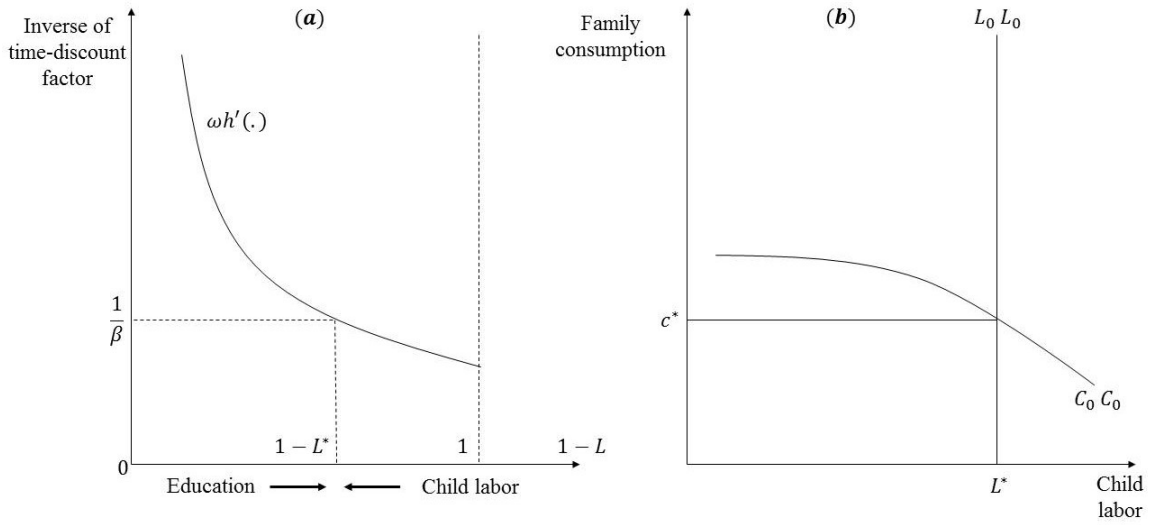


Figure 3 – Public policies and child labor
Source: Das e Deb (2006)

work. Supposing the child has to work, the wage earned by the child and parent are respectively w_c and w_a and $w_a \geq w_c > 0$. Taking into account that child labor reduce future productivity at adulthood as concluded by Basu e Van (1998), i.e $L_t = l_{t-1}$, the family income is given by

$$[w_a h(1 - L_t)] + [w_c L_{t+1}] \leq c_t \quad (3.14)$$

Based on its income level, household maximizes current utility represented by $V_t = u(c_t) + \beta V_{t+1}$, where $\beta \in [0, 1]$ is a variable discount factor. The Lagrangian function which the household has to solve is

$$\mathcal{L} = \sum_{t=0}^{\infty} u(c_t) \beta^t + \sum_{t=0}^{\infty} \lambda_t [w_c L_{t+1} + w_a h(1 - L_t) - c_t] \quad (3.15)$$

Taking $\omega \equiv \frac{w_a}{w_c}$ as adult-to-child wage ratio and resolving the household income and Lagrangian equation, a steady state equilibrium is found by the intersection of the following equations

$$\begin{aligned} \omega h'(1 - L^*) &= \frac{1}{\beta} \\ w_c L^* + w_a h(1 - L^*) &= c^* \end{aligned} \quad (3.16)$$

At this steady state, L^* and c^* denote the magnitude of child labor and household consumption in the long run, respectively. Fig. 3 illustrate the case of child labor at a constant rate of time preference. Graph (a) shows the response of child labor to economic policies in the long run and graph (b) shows how the magnitude of child labor relates with household consumption in the long run.

Analyzing, firstly, the long-run effect of better educational infrastructure on child labor. Having that such policy affect the quality of education directly, Das e Deb (2006)

multiplied A to the equation for human capital, thus, $h = A\tilde{h}(1 - L_{t+1})$. As a result, Eq. 3.16 becomes

$$\omega A\tilde{h}'(1 - L^*) = \frac{1}{\beta}; \quad w_c L^* + w_a A\tilde{h}(1 - L^*) = c^* \quad (3.17)$$

and $\omega h'(\cdot)$ shifts rightward implying reduction in the long run extent of child labor and increase in human capital accumulation since return from schooling becomes more attractive. Reduced child labor causes the $L_0 L_0$ curve to shift left and $C_0 C_0$ shifts right due to greater human capital accumulated. At this point, household's consumption is higher and child labor is lesser.

Another economic policy to consider is enrollment subsidy. An enrollment subsidy refers to programs which transfer cash or in-kind subsidy to poor families conditioned to child's enrollment and attendance in school. The Brazilian *Merenda Escolar* and *Bolsa Família* cash transfer programs are examples of enrollment subsidy. These programs have the basic intention to ease poor families of financial burden and lure their children to school in pursuance of the reduction of intergenerational spillover of poverty and child labor. To model such policy, take $1 - L$ to be school attendance, S_t to be subsidy in value, and that both are positively related. One can imagine that if $S_t \geq w_c$ and the *luxury axiom* holds, parent will find it unnecessary to send its child to work. In this case, w_c is the opportunity cost of sending a child to school. Despite promising, the viability such program is far-fetched due to its large cost. Hence, Das e Deb (2006) considers $S_t < w_c$ assuming that parent might withdraw child from full-time work and send to part-time work. The steady state conditions, given an enrollment subsidy program are

$$\omega h'(1 - L^*) = \frac{1 - (S_t/w_c)}{\beta} \quad \text{and} \quad c^* = w_c L^* + w_a h(1 - L^*) + (1 + L^*)S_t \quad (3.18)$$

What is observed is that an enrollment subsidy program has similar effect to that of investment in educational infrastructure in the long run: reduction of child labor and increase in household consumption.

Furthermore, the authors analyzed the effect of increase in adult wage. The causes of increase in adult wage are diverse, varying from minimum wage laws to international trade policy. Incorporating such policy in the model is quite analog to that of investment in educational infrastructure for it only requires multiplication of a constant term to the $\omega h'(\cdot)$ function. In short, a increase in adult wage reduces child labor and increases consumption in the long run.

Finally, Das e Deb (2006) analyze the effect of a lump-sum subsidy. This subsidy, denoted with \bar{S} , involves direct cash transfer to poor families without conditionalities. Such policy does not alter the $\omega h(\cdot)$ function for not being related to neither labor nor human capital, thus $L_0 L_0$ is unaltered. However, long-run household consumption is in-

creased to a level, which is now

$$c^* = w_c L^* + w_a h(1 - L^*) + \bar{S} \quad (3.19)$$

Another theoretical framework to be considered is that of Basu (2005) which models the effect of imposing fine on firms which employ child labor. This model considers households with an adult and m children. The authors assume that each child produces γ unit of adult's full time labor and the supply of adult labor is perfectly inelastic. Moreover, assume that children are only sent to work if the adult's wage, w , does not attend the minimal subsistence level, s , vice versa. However, if children work, the wage they earn is γw . Supposing that the government in this economy stipulates that a firm caught exploiting child labor will be fined a sum of D and the probability of firms being caught is p . Thus, the fine paid by firms caught is given by pD . In this context, the child labor wage set by firms necessarily has to be $\gamma w < pD$ for child employment to be feasible. As a result, the relationship between adult and child wage is $w^c = \gamma W - pD$. Taking $e \in [1, m]$ as the number of children that a household sends to work if $w < s$, the wage which a child needs to earn to reach subsistence is given by

$$ew^c = s - w, \quad \text{thus} \quad e = \frac{s - w}{\gamma w - pD} \quad (3.20)$$

Eq. 3.20 points that the number of children necessary to attain subsistence level increases if adult wage w continues to decrease. However, the number of children a household has to supply is finite. In this sense, a level of adult wage is attained at which parents judge unnecessary to send children to work, so children are withdrawn from labor market. To identify how the fining of firms relates with the supply of child labor, the government variables (p and D) should be written in function of labor supply as follows

$$e = 0, \quad \text{if} \quad w \geq s \quad \text{or} \quad 0 \geq \gamma w - pD \quad \min \left\{ \frac{(s - w)}{(\gamma w - pD)}, m \right\} \quad (3.21)$$

Fig. 4 illustrates better this relationship. The vertical and horizontal axis represent adult wage, w , and total labor supply, respectively. It is observable that if $w \geq s$ only adults work and the labor supply curve is AB , but if w falls below s children are sent to work. If adult wage declines, the number of children sent to work increases to a certain point at which the number of children available reaches its limit and labor supply is CF . If w continues to fall, the supply of child labor becomes unnecessary since $w_a + \gamma w < s$. Hence, total supply of labor is $ABCFGH$. Now assuming that the demand of labor, represented by $D'D$, is sufficiently elastic and the multiple equilibria scenario is lost, the equilibrium point is set at E .

Assuming government decides to increase fine for child employment, the effect of such policy, at first instance, is the reduction of child wage by the firms. Parents in

Poverty

Poverty has been overtly concurred, in most theoretical and empirical literature, to be the major determinant of the supply of child labor both at the micro and macro level. From the micro-level stance, many empirical studies (BASU; VAN, 1998; KASSOUF, 2001; EDMONDS; TURK, 2002; KASSOUF, 2002; BASU, 2003; HILOWITZ *et al.*, 2004a) defend that families send children to work only if adult's income does not cover the basic needs of the family. Thus, families in situation of poverty or extreme poverty are more likely to send children to work, since rich families do not depend on children's income for subsistence. From the macro-level angle, studies such as Galli (2001), Edmonds (2005), Edmonds e Pavcnik (2005) and Kambhampati e Rajan (2006) concluded that macroeconomic progress reduces child labor. This is because richer societies can offer more free and quality education, better health services and also adopt poverty reduction measures, compared to poorer societies. Moreover, richer societies have higher level of adult wage, which directly reduces micro-level poverty.

Inasmuch as poverty is widely accepted as a major cause of child labor, some studies (BARROS *et al.*, 1994; RAY, 2000; ROGERS; SWINNERTON, 2004; KAMBHAMPATI; RAJAN, 2006; DUMAS, 2007; KASSOUF; JUSTUS, 2010; Repórter Brasil, 2013; SARKAR; SARKAR, 2016) have questioned this relation. In short, these authors claim that the validity of the hypothesis of poverty as the major cause of child labor is doubtful. However, there is, yet, no consensus regarding the basis of such argument in literature. In Barros *et al.* (1994) and Ray (2000), no evidence was provided concerning the invalidity of the hypothesis. However, Bhalotra e Heady (2003) empirically defended, using Ghanaian and Pakistani data, the wealth paradox that children from families with larger farm size (*proxy* for family wealth in agrarian societies) are most likely to be child laborers compared to children from families with smaller farm size.

Similar evidence was found by Dumas (2007) and Kassouf e Justus (2010) who considered farm size a *proxy* for family wealth. On the one side, Dumas (2007) reinstated the wealth paradox, adding that the labor supply of minors is an aftermath of labor market imperfections in rural Burkina Faso. On the other side, Kassouf e Justus (2010) contributed to this motion, using Brazilian data, by indicating that the probability distribution of child labor in function of farm size is a parabola opening downwards. Thus, child labor increases with greater family farm size but reaches a specific maximum point from which it declines.

Different from the wealth-paradox point of view, Rogers e Swinnerton (2004), Kambhampati e Rajan (2006) and Dumas (2007) argued that poverty may not be linked to variations in child labor. To Rogers e Swinnerton (2004) the reduction of poverty may be bound to capital market constraint if adult children from poor families have to make transfers to parent to repay investment made on studies, through loans during childhood.

Kambhampati e Rajan (2006), using state-level macrodata from India, concluded that increase in income due to economic progress may lead to increase in child labor. According to these authors, the channel through which this might occur is by the increase in demand of goods and services as aftermath of general economic growth. To Dumas (2007), child labor may emerge not as a result of household needs but as a result of labor market imperfections such as lack of landless class, high homogeneity in factor endowments and high level of synchronicity in labor needs across households.

Now we turn to evidences from Brazil. Barros e Mendonça (1991), using the PNAD data from the metropolitan areas of Fortaleza and São Paulo, tested the role of household-level poverty to reduce child labor. These authors found that to reduce the Labor Force Participation Rate of minors (LFPR) in São Paulo from 10% to 5% family-level per capita income has to increase in, approximately, 120%. For the metropolitan area of Fortaleza, these authors found that to reach the same target for the LFPR of minors family-level per capita income has to increase in about 87%. Hence, the elasticity between family-level poverty and child labor is very weak. Similarly, Barros *et al.* (1994) studied the role of poverty in explaining the rate of child labor in Latin America with focus on the urban areas of Brazil. In this course, these authors considered both household-level poverty and society-aggregated-level poverty. The reason for such distinction is to isolate the effect of each type of poverty, since poor households in poor societies do not face the same price levels and resources constraint as poor households in rich societies.

The first approach adopted by these authors is the comparison of 14 Latin American countries using information from Cepal (1992). According to this data, the LFPR of minors is heterogeneously distributed among Latin American countries. In specific, higher LFPR of minors were found for Brazil, Guatamala and Honduras, while lower LFPR was found for Chile, Venezuela and Uruguay. By adjusting the LFPR of minors from these countries with their respective level of per capita income, the authors found that higher LFPR of minors was not explained by lower level of per capita income for Mexico and Brazil. It was observed that, compared to countries of similar per capita income, Brazil had about 6 p.p. higher LFPR of minors. However, evidence was found concerning an inverse relationship between poverty and child labor for Latin American countries as a group.

Having this inverse relationship, these authors inquired for the reduction of average per capita income necessary to reduce LFPR of minors from 10% to 5%. For the Latin American countries as a group, an elasticity value of 0.406 was observed, implying that for child labor rate to reduce from 10% to 5% per capita income has to increase by, approximately, 120%. According to these authors, this will take about 27 years if the per capita income increases at the annual rate of 3%. Thus, the relationship between poverty and child labor rate in Latin American countries is inelastic. Regarding Brazil in specific,

this inelasticity was way higher, implying that increase of about 340% in per capita income will be necessary to reduce child labor rate from 10% to 5%. Hence, elimination of child labor in Brazil through growth was deemed unfeasible.

For more evidence regarding the poverty-as-cause hypothesis, Barros *et al.* (1994) use data from the National Household Sample Surveys (PNADs) to investigate if higher child labor is observed in areas and periods of higher level of poverty in Brazil. As for regional disparities, higher LFPR of minors was observed in richer metropolitan areas (Southeast Brazil) compared to poorer metropolitan areas (Northeast Brazil). Similarly, temporal variations point to higher LFPR of minors during periods of lower poverty (around 1986) and lower during period of higher poverty (around 1983). Aside rejecting the poverty-as-cause hypothesis, such relation points to the wealth paradox.

Thus, Barros e Mendonça (1991) and Barros *et al.* (1994) concluded that micro and macro-level poverty are determinants of child labor in Brazil, but are far from being the major cause of the high rates observed in Brazil in the 1980s and 1990s.

An interesting point to highlight regarding these studies is that if these authors initially assumed that child labor is caused by price levels, household endowment and preferences, but choose to ignore household preferences for being subjectively determined and not measurable, and concluded that the economic variables (price levels and household endowments) have weaker effect on child labor, these authors implicitly admitted the importance of household preferences. However, blind eye was turned to preferences as an important factor by these authors, which is very common in literature.

In order to back this up, it is important to take into account the circumstances of child labor in the period studied by Barros e Mendonça (1991) and Barros *et al.* (1994). As detailed in Chapter 2, the legal regulation of child labor only occurred effectively in 1988. Until then, child labor was considered to be morally, culturally, socially, ideologically and legally correct. It would, however, be naive to imagine that child labor becomes morally, culturally, socially and ideologically incorrect simply because it became legally incorrect. What is being argued here is that in the 1980s and 1990s, the values of child labor were still firmly rooted into the Brazilian mentality a positive phenomenon. Thus, completely abstracting from these values, which undoubtedly influence household preferences regarding child labor, was not a smart move.

It is worthwhile to emphasize that poverty continues to be a cause of child labor, but its role as the major determinant is questionable in Brazil. To support this argument, empirical evidences found in some studies regarding the link between poverty and child labor were collected and presented in Table 1.

Three major features are perceptible from this table: a) preeminent interest on family-level poverty in literature; b) negative sign of coefficients and most importantly;

c) very small coefficients. As mentioned in the introductory section of this essay, most empiric studies focus on the micro-level causes of child labor, thus, neglecting important macro-level determinants. Moreover, in addressing individual-level factors, studies opt to control for parent's level of education and omitting family income with the judicious apology of the former being more informative and to avoid high multicollinearity.

Concerning the relationship between poverty and child labor, one can easily perceive the consensus of the Brazilian literature towards a negative sign. Hence, higher family income is cogent to reduce the number of children and adolescent working in Brazil, although the degree of such effect does not seem so enticing as conventional theories preach.

Kassouf (2001) used 1995 PNAD data to estimate probit models for child work and studies considering as regressors, alongside with others, father and mother's income, which served as a *proxy* for family income. It is important to note that these regressors were estimated due to unavailability of data regarding wages at community level. Notwithstanding, this author found that, in the Brazilian urban areas, each percentage increase in father and mother's income reduces the probability of boys to work in 0.06 and 0.02 percentage points (hence, p.p.), respectively. Similarly, each percentage increase in father and mother's income reduces the probability of girls to work in 0.02 and 0.01, respectively. Here, we notice that the effect of father's income is higher.

Similarly, Schwartzman e Schwartzman (2001) estimated a logit model using 2001 PNAD data to determine the micro-level causes of child labor in Brazil. These authors adopted the logarithm of family's per capita income as a *proxy* for level of poverty. Also observing a negative sign, they concluded that each percentage increase in family income reduces, approximately, 0.067 p.p. in the probability of child labor.

Alike Kassouf (2001), Emerson e Souza (2003) investigated the determinants of child labor using 1995 PNAD data to estimate probit models. Note that these authors subtracted children's income from the total family income so as to isolate the effect of adult's income. The coefficient observed for net family income was far weaker than those observed so far (0.00012 p.p.). Similarly, Aquino *et al.* (2010) used 1992 and 2004 PNAD data to estimate probit models, using net family income as one of the regressors for child labor. No statistical evidence was found in models for 1992 PNAD data. The estimates observed in the models for 2004 PNAD concerning the effect of family income in urban and rural areas were similar to that found by Emerson e Souza (2003).

On the course to identify the regional determinants of child labor, Cacciamali *et al.* (2010) estimated separate probit models for urban and rural areas. In addition, the same models were estimated for each region in Brazil. Regarding urban-rural differences, statistical evidence was found for the role of household's per capita income in reducing child labor only in rural areas (-0.00090 p.p.). Regionally, these authors concluded that

Table 1 – Coefficient observed for relationship between poverty and child labor in previous studies for Brazil.

Author	Variable description	Data and sample	Coefficient
Kassouf (2001)	Log of mother's salary – boy (urban)	PNAD (1995)	-0.0155
	Log of father's salary – boy (urban)		-0.0550
	Log of mother's salary – girl (urban)		-0.00987
	Log of father's salary – girl (urban)		-0.0184
Schwartzman e Schwartzman (2001)	Log of family per capita income	PNAD 2001	-0.067
Emerson e Souza (2003)	Family income without children's income	PNAD 1995	-0.00012
Aquino <i>et al.</i> (2010)	Family income without children's income (rural)	PNAD 1992	NS
	Family income without children's income (rural)	PNAD 2004	-0.00016
	Family income without children's income (urban)	PNAD 1992	NS
	Family income without children's income (urban)	PNAD 2004	-0.00003
Cacciamali <i>et al.</i> (2010)	Household's per capita income	PNAD 2004	NS
	Household's per capita income (urban)		NS
	Household's per capita income (rural)		-0.00090
	Household's per capita income (north)		NS
	Household's per capita income (northeast)		-0.00098
	Household's per capita income (southeast)		NS
	Household's per capita income (south)		NS
	Household's per capita income (midwest)		0.00179
Kassouf e Justus (2010)	Log of family income (rural area)	PNAD 2006	-3.75
De Carvalho Filho (2012)	Total benefit – girl	PNAD 1989, 1990, 1993 and 1995	NS
	Benefit to old-age female – girl		-0.130
	Benefit to old-age male – girl		NS
	Total benefit – boy		NS
	Benefit to old-age female – boy		NS
Ramalho e Mesquita (2013)	Benefit to old-age male – boy	PNAD 2001-2009	NS
	Log of household's income per capita in urban Brazil		NS

Source: Prepared by author.

Note: NS denotes non-significance at 10% level

household per capita income has negative effect on child labor in the Northeast (about -0.00098), but positive effect in the Midwest (about 0.00090). In Kassouf e Justus (2010), conclusion was drawn that child labor in agricultural and livestock activities reduces in 3.75 p.p. for every 1% increase in income of families who reside in the rural area. Thus, taking into account results found by Aquino *et al.* (2010), Cacciamali *et al.* (2010) and Kassouf e Justus (2010), it is convincing to deduce that child labor in rural areas is more sensitive to changes in family-level poverty.

De Carvalho Filho (2012) estimated a triple difference model in order to verify the effect of exogenous shocks in household income on labor participation and school enrollment of children in Brazil. To account for exogenous shocks, these authors considered financial old-age benefits as *proxy* for family income. The reason for this is that financial old-age benefits emerged as a constitutionally mandated reform in the social security system in 1991. Thus, as such benefit never existed before then, family income was exogenously increased. This author also estimated separate models for boys and girls to observe gender-effect. Generally, these authors found no significant effect of exogenous increase in family income on child labor. However, considering the gender of the old-age beneficiary, evidence was found that 100 reais benefit to elderly women reduces in 0.13 p.p. the probability of girls to work.

Last but not least, Ramalho e Mesquita (2013) used 2001-2009 PNAD data to estimate dynamic panel models with the objective of identifying the determinants of child labor rate in urban areas of Brazilian states. Similarly to De Carvalho Filho (2012), no statistical evidence is found regarding the linkage between poverty and child labor.

At this point, it is apparent that the conclusions of these studies converge to: if there is, at all, causal relationship between child labor and poverty in Brazil, the elasticity of such relation is certainly weak. In other words, significant reduction of child labor through poverty measures requires family income to increase to exorbitant levels.

Level of Urbanization

According to previous studies, urbanization rate is also an important determinant of child labor. This is not only because of the difference in the level of poverty, but also due to peculiarities attached to the type of child labor concentrated in both rural and urban areas in terms of proportion, visibility and sectoral distribution. There is consensus in national and international literature that the rate of child labor is greater in rural areas. However, in Brazil, despite higher rates are observed in the rural areas, the number of children and adolescents who work is higher in the urban areas due to the high population density (INAIÁ, 2008; Repórter Brasil, 2013; KASSOUF, 2015).

Other factors which increase the labor force of children and adolescents in the

urban area is the availability of better quality education, health services and greater economic opportunities. Such factors tend to encourage migration from rural to urban areas. It is, however, important to note that inasmuch as the conditions of an urbanized area apparently seem better, one has to take into account the effect of inequality and wage differences between skilled and unskilled workers. According to Barros *et al.* (1994), the socioeconomic condition of poor households or unskilled workers in the urban areas is more harsh compared to the same group in rural areas. Some plausible reasons for this are wage gap between skilled and unskilled labor, higher cost of living, more competitive labor markets, etc. (FERREIRA-BATISTA; CACCIAMALI, 2012).

Sectorial Distribution

The activities in which children and adolescents are engaged vary significantly. However, there is consensus in literature that the agricultural sector is most responsible for the usage of this vulnerable labor force in Brazil (KASSOUF, 2004). In the findings of this author, about 54.2% of the child laborers between age 5 and 15 were engaged in agricultural activities, especially in the rural areas. In descendant order of the sectoral participation of child laborers of the same age group, the agricultural sector was followed by the service and commercial sectors with 18.5% and 14.7%, respectively. In the same year, the industrial sector was responsible for the employment of about 7.2%, while the construction sector employed about 2.1% of child laborers.

According to Inaiá (2008) and the report published by Repórter Brasil (2013), aside the concentration of child labor in the agricultural sector, some of its features are quite worrisome. These features include high incidence of recruitment of child laborers between age 5–9, preference for boys, long working hours, work with sharp objects, exposure to toxic materials and intense solar radiation. Still, it is important to note that children and adolescents are employed by the family in numerous cases in the rural Brazilian areas. Generally, in such instance, child labor is conceived as positive to the development of a child and also as helping hand, form of socialization and heir training by the family (MARIN *et al.*, 2012). Thus, child labor, especially in family agriculture, is backed up and perpetuated by cultural beliefs. Similar beliefs are attributed to child labor in domestic activities, mainly for female children, which is considered one of the worst form of child labor since it is generally time exhaustive, prone to sexual exploration and invisible to political measures.

According to the publication of Repórter Brasil (2013), despite child labor in urban Brazil is more exposed compared to that in the rural, government policies are becoming shorthanded in reducing the number of children and adolescents who work in informal activities of urban areas such as collection and selection of waste, itinerant trade or street hawking, load carrying in markets and drug trafficking. This report also pointed that

child labor is, on the one hand, highly associated to family cultural beliefs in rural areas, while, on the other hand, associated to consumerism, search of financial independence or social inclusion and even addiction in the urban areas. Furthermore, the authors reported cases of children who had basic needs satisfied but opted to work in order to acquire material objects which their parent wouldn't or couldn't buy such as bicycles, video games, cellphones or branded cloths. An example from this report, among many others, was that of a 10 years old boy who started working because other children had bicycles but he didn't. As a result, this boy lost one of his eyes while mounting boxes which transported vegetables³. This lesson teaches that children are not merely subjects of civil rights, but also of desires and needs which are not contented by basic provisions.

Buttressing the point on childrens' desires, Feffermann (2006) noted that children, adolescents and youths who venture into drug trafficking see it as a form of fitting themselves in the world of consumption created by the capitalist economy. Moreover, the author claims that most of these youths feel respected and recognized because they now have financial capacity to buy expensive items. It is important to note that such feeling is not limited to drug traffickers, but also every other child, adolescent and youth in the situation of social exclusion, which is common in urban areas. The aftermath of such situation, generally in urban areas, is early work in formal or informal, temporary or permanent and legal or illegal sectors.

DeGraff *et al.* (2016) focused their study on child laborers engaged in risky occupations which cause harm to their health, safety and morals. These authors chose their definition of "risky" following specifications of the ILO and the Brazilian Ministry of Labor and Employment. Specifically, the categories of risky occupations addressed in this study are domestic workers, street workers, construction workers and farm workers engaged in the cultivation of tobacco, coffee, sugar cane and manioc. Having that the ILO regulations and Brazilian Constitution prohibit risky work for individuals below age 18, these authors considered the age group between 10 and 17. General findings from this study point that most child laborers in risky working conditions are engaged in domestic services and hazardous farming, followed by the construction and street work. These authors also found that this ranking order is preserved in both rural and urban areas, however, there were relatively greater proportions in the former compared to the latter. As per gender distribution in these risky occupations, it was found that there is greater concentration of girls in hazardous occupations. Specifically, most of these girls are involved in domestic services, while boys are mostly involved in construction activities, hazardous farming and street work.

³ The testimony of this boy, already adult, was presented in a seminar organized by the Superior Court of Labor (TST, in Brazilian acronym) and made available in: <<http://www.youtube.com/watch?v=xuKh1-lOx8>>.

Unemployment

Very few studies have been carried out regarding the effect of economic growth and adult unemployment on child labor in Brazil. Empirical evidences from Edmonds (2005), using Vietnamese data, points that child labor reduces with economic growth, however, highlighting that such relationship is non-linear. In contradiction, Kambhampati e Rajan (2006) found empirical evidence, using data from India, that contrarily to conventional wisdom, increase in economic growth increases child labor as aftermath of the increase in the demand of cheaper labor by firms. The authors, however, noted that child labor is only reduced when growth is sustained sufficiently to outweigh increase in the demand of cheaper and unregulated labor. Abu-Ghallow (2012), using Palestinians data, concluded that increase in unemployment, which is also indicative of economic progress, leads to increase in the rate of child labor.

As for Brazil, Duryea *et al.* (2007) used Brazil's Monthly Employment Survey (PME, in Brazilian acronym) to analyze the impact of household economic shocks, especially unemployment, on schooling and employment of youths in metropolitan Brazil. The empirical strategy used was that of probit model and the database adopted covered about 100.000 children between age 10 and 16 from 1982 to 1999. The hypothesis alleged goes in line with that theoretically posed by Basu (1999) and Galli (2001) that adult unemployment may lead to increase in child labor. The general estimation results provided statistically robust evidence which does not reject this hypothesis. Specifically, unemployment shocks to male household head in the metropolitan Brazil increases the likelihood of children between age 14 and 16 to enter the labor market. However, in a specific model where authors created an interaction variable between employment shocks and a dummy variable indicating children between age 10 and 14, statistically robust evidence was found concerning a negative relationship between adult unemployment and child labor. Although counterintuitive, such idea supports the observation made by Basu e Van (1998) concerning the possible ambiguous effect of adult unemployment on child labor.

Conditional Cash Transfer Program

There are variety of welfare programs adopted in Brazil to ease poor and extremely poor families of financial constraints. Similarly to other developing countries, one of these measures involve conditional direct cash or in-kind transfer.

One of the first conditional cash transfer (henceforth, CCT) programs – *Bolsa Escola* and *Renda Mínima*⁴ – were created in the mid 1995s in the city of Campinas located in the state of São Paulo. These programs granted financial subsidy to poor

⁴ Schooling grant and Minimum Wage, respectively.

parents, who were obliged to enroll their children in schools. In 1996, the Program for Elimination of Child Labor (PETI, in Brazilian acronym) was created due to the high proportion and stark situation of children in the labor market. Specifically, the PETI had the objective of withdrawing children and adolescents between age 7 and 15 from hazardous work and enroll them in schools (SOARES; SÁTYRO, 2010). Aside enrollment in schools, the PETI program required children to participate in extracurricular sport, cultural, artistic and leisure activities in order to inhibit time allocation to work. Despite greater attention was given to children and adolescents, the PETI program also created job opportunities for families who earn less than half of the minimum salary in order to prevent such families to send children back to work.

In 2003, all the cash and in-kind transfer programs designed to reduce poverty were united form a single conditional cash transfer program – the *Bolsa Família* Program (henceforth, PBF), which has nationwide coverage. The participation of families in the PBF was conditioned to the level of income. Whereas, for continuity of participation, beneficiary families have to meet additional conditions concerning health care and enrollment and attendance of children in school. Therefore, one can suppose that the program seek to increase the human capital of poor families through education and health, which in turn yield better income distribution in the long run and also break poverty cycle.

In 2005, the PETI program was incorporated together with the PBF cash transfer for the sake of better management and to exploit the synergy between both programs. Despite the critics regarding the amalgamation of these welfare programs, numerous studies have pointed out that such action was imminent in order to optimize public resources, increase coverage and enhance accessibility of grants by eligible families. Albeit the main characteristics of the PETI program were maintained, the major objective of the PBF program is to reduce poverty.

In specific, the PBF program attends families which are below the poverty line⁵, giving priority to families with pregnant women or children or adolescents under age 17. Regarding financial values, a fixed amount of R\$77 (Brazilian currency) is transferred to extremely poor families irrespective of family structure. In addition, a variable amount between R\$35 and R\$175 is passed on to poor and extremely poor families depending on the family structure. Having that the PBF program only addresses families below the poverty line, the PETI program was reconfigured to focus on families child laborers from families above the poverty line. However, the value transferred is expressively lower than that of the PBF program – R\$ 25 per child to families who reside in rural or urban areas with less than 250 thousand inhabitants and R\$ 40 per child to families who reside in urban areas with more than 250 thousand inhabitants⁶.

⁵ In 2014, the poverty and extreme poverty line are set at R\$154 (\$1.90 per day) and R\$77 (\$0.95 per day) monthly per capita income, respectively.

⁶ Current values as at August/2016.

Generally, many criticize the PBF program regarding the unlimited period of participation and number of families to be benefited by the program. As per number of eligible families, the major argument is that setting a limit will enhance efficiency of resources allocation in the sense that only the needy will be benefited. In respect of this argument, Silveira *et al.* (2013) alleged that the program is more interested in the inclusion and not the exclusion of beneficiaries. As per the period of participation, critics defend that the lack of stipulation of the maximum period of which families will be benefited makes beneficiaries “lazy” in the sense that the benefits may be conceived as a living. In response to this, Jannuzzi e Pinto (2013) affirmed that the program contributed to increase school attendance of children from poor families and enhance nutrition and health conditions of beneficiaries. In addition, these authors affirmed that the supposed lazy spirit was a myth because data also pointed that the insertion of beneficiaries in the labor market is relatively the same as that of non-beneficiaries. Still, it was added that the program contributed to accelerate economic dynamics through the multiplier effect of the consumption of beneficiaries.

Most empirical studies which sought the effect of CCT programs on child labor analyze its effect on the time allocation of children and adolescents. Findings from international studies such as Ravallion e Wodon (2000) and Maluccio e Flores (2005) point out that CCT programs produce positive effect on schooling and inverse effect on child labor. Attanasio *et al.* (2006) also, empirically, supported this finding affirming that CCT programs cause significant increase in time allocated to studies and also increases the school enrollment of children who are prone to enter the labor market early. However, studies such as Duryea e Morrison (2004) and Glewwe e Olinto (2004) fail to find effect of cash transfer programs on child labor.

In Brazil, there are still very few empirical studies which investigated the effect of the PBF program on child labor. Therefore, no consensus is reached yet.

Cardoso e Souza (2004), using 2000 census data and propensity score methods, analyzed the impact of the *Bolsa Escola* program⁷ on child labor and school attendance. These authors found that the program had significant positive effect on school attendance for both boys and girls. However, the program was found shorthanded in the task of reducing child labor. In fact, the author observed that cash transfer were too small to persuade families to forgo income from child work. Instead, families preferred children to combine work and school. They also concluded that even if cash transfer could cover child’s income parents and children may not be convinced to renounce extra income if the contribution of the child to family income is high.

Ferro e Kassouf (2005) used 2001 PNAD data to also verify if the *Bolsa Escola* had significant effect on child labor. Specifically, these authors opted for probit models to

⁷ A CCT program which preceded and had similar objectives to that of the *Bolsa Família* program.

identify if the program influences the probability of a child to work or not, and adopted weighted least square methods to ascertain if the program, at least, reduces the weekly hours of work of children who are already in the labor market. Regarding working hours, Ferro e Kassouf (2005) found evidence that participation in the program reduces about 3 working hours of child laborers. However, these authors highlighted that such reduction has limited effect in the sense that it covers, mostly, children who do part-time work. This is because most children who engage in full term jobs have less incentive to participate in the program due to its modest values. Result concerning the probability of working pointed that children from families which participated in the program are more likely to work. However, these authors commented that such unexpected relationship may be due to family unobservables such as “ambition”. In sum, these authors reached the same conclusions as Cardoso e Souza (2004) regarding the effect of the *Bolsa Escola* program that children from beneficiary families are most likely to conciliate work and study and are not convinced to leave work.

In line with findings in Ferro e Kassouf (2005), Ferro *et al.* (2010) used 2003 PNAD data to estimate probit models and propensity score matching approach. These authors concluded that the *Bolsa Escola* program reduces the probability of children from beneficiary families to work and increases the school enrollment of the same. However, no evidence was found concerning working hours or conciliation of work and schooling. Specifically, Ferro *et al.* (2010) pointed that the program reduces probability of working by 2 to 3 p.p. in the urban areas and 6 to 9 p.p. in rural areas.

Regarding the PBF program, Cacciamali *et al.* (2010) analyzed its impact on child labor and school attendance using 2004 PNAD data to estimate probit models. The estimates from these models indicated positive relationship between the PBF program and child labor, i.e, children from beneficiary families are more likely to work. These conclusion was sustained in models for urban and rural areas, and also in models for separate regions in Brazil. However, Cacciamali *et al.* (2010) found that the program was efficient in increasing school attendance of children and adolescents. These authors clarified that, different from the PETI program, the main objective of the PBF program is not to eliminate child labor but to reduce poverty. Moreover, they added that for effective reduction of child labor the value transferred to families has to be more generous and education quality has to be appealing in order to create incentive to sway children from work to school. These authors suggested that aside enrollment, the inclusion of conditionality regarding cultural, sport or artistic extracurricular activities alike the PETI program may contribute to better allocation of children’s time.

Still on the effect of the PBF program, Araujo *et al.* (2010) sought empirical evidence regarding its role on child labor among beneficiaries who reside in Brazilian urban areas. The methodological strategy used to reach this objective was that of propensity

score matching using 2006 PNAD data. Similarly to previous authors, Aquino *et al.* (2010) concluded that the PBF program was efficient in increasing the school attendance and enrollment of children and adolescents. However, the program presented shortcomings regarding the reduction of child labor. These authors also buttressed the role of household unobservables in the decision of child labor supply and participation in the PBF program. Also adopting propensity score matching method for 2011 PNAD data, Do Nascimento *et al.* (2016) concluded that participation in the PBF program has no significant effect neither on the probability of a child to work nor working hours. However, evidence was found that the sum transferred to families contribute to reduce the probability of child labor, likewise working hours.

Conclusively, these studies pointed that the participation in PBF program has no conspicuous effect on the probability of children and adolescents to work. However, most studies found its effect in reducing working hours. Such unsatisfactory effect of this program may be due to, firstly, the low elasticity of child labor to changes in poverty as showed in Table 1. It is also important to take into account that, as theoretically pointed out by Das e Deb (2006), the value transferred to families are relatively too low compared to the income of child laborers. Thus, extremely poor families are less motivated to participate in the program and those who opt to participate are less willing to withdraw children from work⁸. Lastly, it is worthwhile to also consider that the culture of child work as positive plays important role in narrowing the reach and effect of the PBF program (see Chapter 2 of this master's thesis). As noted by Silveira *et al.* (2013) regarding the PBF program, "some effects are difficult to measure and some are dubious".

Labor Inspection

As aftermath of the dramatic increase in the number of children and adolescents working in the 1980s, the Brazilian government recognized child labor as a problem which deserves priority. One of the adopted measures was the Labor Inspection with focus on child labor. These Labor Inspection activities are conducted by the Secretariat of Labor Inspection (SIT), which is part of the Brazilian Ministry of Labor and Employment (MTE).

Concerning the inspection process, an annual plan is drawn by the Regional Superintendencies of Labor and Employment (SRTEs) based on the guidelines of the SIT. This plan is sketched taking into account the reports of child labor, prioritizing the worst forms. Having planned, labor inspectors are responsible for the preventive actions and inspection activities. The preventive actions involve awareness-creation by publicizing the negative impacts of child labor through lectures, seminars, debates and campaigns to chil-

⁸ See detail regarding conciliation of work and schooling by children in Inaiá (2008) and its evolution in Kassouf (2015).

dren, employers and families. Months after preventive actions labor inspectors conduct inspection activities, which involve visit of businesses or workplaces in urban and rural areas throughout the country (ILO/SIT, 2010).

During these visits, inspectors identify irregularities concerning child labor, fill out an examination form regarding the characteristics of the work exercised by the child, withdraw child from work and issue infraction reports regarding exploiter, which may lead to fining. In order to avoid return to work, children and adolescents are included in social welfare programs. In specific, children under the age of 14 are enrolled in cash transfer programs conditioned to school attendance and participation in social, educational and health care projects. Moreover, adolescents above the age of 14 are enrolled in apprenticeship programs, which offer technical training in workplaces with the intention of learning and not production. In addition, the SIT published data regarding the undertaken inspection activities in the Information System of Child Labor (SITI) since 2006.

The ILO/SIT (2010) report pointed out to positive results of the Labor Inspection in Brazil concerning the number of children which have been withdrawn from work. Still, this report added that the efficiency of the inspection activities should not be measured only take into account the number of children removed from work, but also by the awareness-creation. This is because the preventive actions undertaken by inspectors increased the visibility of child labor issues in the society, which impacted on the attitude of the media, governmental institutions, employers and families.

The only empirical study found regarding the effect of Labor Inspection on child labor till date⁹ was that of Almeida (2015). Having that most inspection decisions are taken based on complaints filed regarding child labor, the estimation of the effect of Labor Inspection on child labor is subdue to underestimation and endogeneity. Therefore, this author adopted a two-step generalized minimum least squares method using data for 2000 and 2010 from census and SITI database. In the first stage estimation the distance between inspection agencies and firms and the number of labor inspectors were used as instruments in order to estimate number of inspections. Subsequently, the estimate for Labor Inspection was inserted as regressor in the second stage model, which was for child labor. As for year 2000 and 2010 data, it was found that 1% increase in the number of labor of inspection reduces the proportion of child laborers between age 10 and 17 in 0.22% and 0.26%, respectively. In absolute terms, the Labor Inspection accounted for the reduction of, approximately, 8,658 and 8,856 child laborers in year 2000 and 2010, respectively.

Based on the empirical literature presented in this section, it is possible to create insight of the signs and challenges expected from our modeling exercises. We expect an

⁹ October/2016.

inverse relationship between poverty and child labor rate. However, previous studies point that the degree of such relationship is lower than expected. Reviewed studies indicate that child labor is lower in urban regions, i.e, we expect a negative relationship between urbanization and child labor rates. As to sectoral distribution, one expects to find higher rates of child labor in the agricultural sector compared to the service, trade and industrial sectors. As to unemployment rate, consensus was observed in empirical studies towards a positive sign, i.e, the increase in unemployment rate should lead to increase in the rate of child labor. Last but not the least, the signs expected from the main variables of interest, PBF and Labor Inspection, are negative. On the one hand, most empirical studies found that children from poor families who benefit from the PBF program have lesser probability of working compared to children from poor families who do not participate in the program. On the other hand, empirical evidence sustain the hypothesis that the Labor Inspection contributed to reduce child labor in Brazil.

The major challenge for the modeling exercise is endogeneity. The variables of interest PBF and Labor Inspection are suspected to be highly endogenous since they are governmental factors which are also determined by the level child labor. The empirical strategy adopted to circumvent this challenge will be detailed in the next section.

3.3 Methodology

3.3.1 Data

The main source of data used to reach the objective of this essay is the PNAD conducted by the IBGE. Moreover, data concerning the *Bolsa Família* Program (abbreviated, PBF) and Labor Inspection were obtained from the Ministry for Social Development (MDS in Brazilian acronym) and Ministry of Labor and Employment (MTE in Brazilian acronym), respectively.

As this essay focus on the macro-level determinants of child labor and the effect of intra-national policies adopted by the Brazilian government to combat child labor, individual data from PNAD were aggregated to Brazilian state level. Therefore, both continuous and dummy variables were transformed in means and proportions computed using the weights or sample expansion factors provided by the IBGE in the data files. By aggregating data to state level and covering the period between 2004 and 2014 (without data for 2010), we create a panel data composed by 27 states over 10 years. Note that data concerning the Labor Inspection only covers the period between 2006 and 2014 and had missings for some states. Thus, instead of having 210 observations (27 states times 10 years), we ended up with the total of 207. However, the overall panel data is strongly balanced, even though with few gaps.

Table 2 presents the mean and standard deviation for variables that are considered for model specification. Note that the standard deviation is decomposed into between and within deviations. From this table, we observe that the former is greater than the latter for all variables. This implies that there is expressive heterogeneity among states.

The rate of child labor among individuals between age 5 and 15 during the period of 2004 to 2009 and 2011 to 2014 was about 6.29%. As we will illustrate in Section 3.4, this rate reduced significantly during the referred period. As per family variables, an average Brazilian family is comprised of, on average, 4 members and the level of education of mothers was approximately 8 years. During this same period, the average per capita family income was, approximately, R\$ 715.

Table 2 – Summary statistics for panel data used for estimation

Variable	Description		Mean	Std. Dev.	Min	Max
chidlabor	Percentage rate of child labor	overall	6.29	3.20	0.61	17.11
		between		2.48	1.12	11.68
		within		2.07	1.19	12.67
childeduc	Percentage of children and adolescents between age 5 and 15 enrolled in school	overall	92.24	3.26	80.97	97.60
		between		2.39	87.03	95.54
		within		2.25	85.69	98.84
famincome	Average family income per capita	overall	714.87	294.80	276.79	1,962.02
		between		273.90	408.05	1,624.42
		within		119.98	291.30	1,052.47
mothereduc	Average years of mothers' schooling	overall	7.68	1.15	4.85	10.59
		between		0.97	5.77	9.79
		within		0.64	6.01	9.02
familysize	Number of family members	overall	3.88	0.35	3.21	5.16
		between		0.32	3.41	4.56
		within		0.17	3.40	4.48
PBF	Per capita value transferred by the PBF to states in reais (Brazilian currency)	overall	88.25	68.43	5.41	317.43
		between		42.94	22.70	159.63
		within		53.86	-26.72	246.05
inspect	Number of Labor Inspections with focus on child labor	overall	176	250	1	1,510
		between		136	20	603
		within		-210	413	1083
unemp	Unemployment rate among economically active population	overall	5.89	2.36	1.69	15.06
		between		2.20	2.65	12.24
		within		0.99	1.19	8.71
urban	Urbanization rate in percentage	overall	80.23	9.32	58.25	98.21
		between		9.087	63.89	96.78
		within		2.63	72.46	85.85

Source: Prepared using data from PNAD.

Note: Number of observations is 270, except for the **inspect** variable which has 207 observations.

Regarding the **childeduc** variable, it is quite impressive to observe that about 92% of children between age 5 and 15 were enrolled in school during the period in view¹⁰.

¹⁰ To construct this variable, we took into account the minimum age for compulsory education and its respective changes over time.

The two variables of interest, **PBF** and **inspect**, indicate that the average per capita value transferred by the PBF is about 88 reais and that about 176 work inspections are conducted all over the states during the period of 2004–2009 and 2011–2014. We also observe that the unemployment rate during the referred period was at about 6%. It is quite important to recall that these statistics are only for general insight concerning the magnitude and scale of variables.

3.3.2 Econometric Procedures

In order to adequately model the macro-level determinants of child labor in Brazil we adopted a procedurally constructive strategy and present the results in Table 3. Note that the focus here is on estimates, but on the choice of model which best suits the objective of this study.

In terms of model specification, the response variable is the rate of child labor, which is defined based on the specifications of the ILO and the Brazilian Federal Constitution as presented in Chapter 1. Therefore, a *child laborer is any individual between the age of 5 and 15 involved in any labor activity deemed formal or informal, domestic or non-domestic, temporary or permanent, paid or unpaid labor activities, except in condition of apprenticeship*. This variable is denoted as **childlabor**.

The group of regressors is composed of the: proportion of children and adolescents between age 5 and 15 enrolled in school (**childeduc**); average family income per capita (**famincome**); average years of mothers' schooling (**mothereduc**); average number of family members (**familysize**); per capita value transferred by the PBF program to states (**PBF**); number of Labor Inspections with focus on child labor (**inspect**)¹¹; unemployment rate among economically active population (**unemp**); urbanization rate (**urban**); group dummy for years to control for time shocks (**years**), and lastly; control for long-run tendency of a time series effect of child labor (**trend**).

The starting point of the modeling exercise was the pooled regression

$$\text{childlabor}_{it} = \alpha + \mathbf{x}'_{it}\beta + u_{it} \quad \text{where} \quad u_{it} = \alpha_i - \alpha - \varepsilon_{it} \quad (3.22)$$

estimated by OLS method alike a cross-sectional model. **childlabor**_{it} is a column vector of the response variable, **x**'_{it} is a matrix of $N \times K$ regressors which vary over time, t , and across state, i , and u_{it} is the idiosyncratic error term which consists of time-invariant factors (α_i) and time-variant omitted factors (ε_{it}). Similarly to the conventional OLS model, the Pooled OLS model also assumes exogeneity of regressors, $E(u_{it}|\mathbf{x}_{it}) = 0$, conditional homoskedasticity, $E(u_{it}^2|\mathbf{x}_{it}) = \sigma^2$, and conditionally uncorrelated observations,

¹¹ Due to unavailability of this focused inspection for years prior to 2006, little adjustments were made while modeling equations with this variable so as to avoid observation loss for other regressors

$E(u_{it} u_{jt} | \mathbf{x}_{it} \mathbf{x}_{jt}) = 0$, where $i \neq j$. The violation of the exogeneity assumption leads to inconsistency of β estimates, whereas the violation or relax of the last two assumptions makes the Pooled OLS model no longer fully efficient.

The results from this initial model is provided in column OLS of Table 3. The Breusch-Pagan test for heteroskedasticity on this model provided a value for the OLS model, all likely unobservable and omitted factors are incorporated with the error term, u_{it} , and are assumed uncorrelated with the regressors. However, in light of the cultural-historical background of child labor in Brazil presented in Chapter 2, it is important to control for unobservables in the model. The reason for this is that factors such as cultural, ideological and social beliefs may sprout innate differences among states (BASU, 1999). Such control is not possible in the OLS models, so we resort to Fixed and Random Effect models (FE and RE, respectively). These models admit the presence of a time-invariant component in the error, thus permitting control of state time-invariant unobservables.

Table 3 – Models from estimation procedures

Response variable: chidlabor				
	OLS	RE	FE	GMM-I
constant	19.80*** (2.055)	18.97*** (2.959)	6.577 (4.096)	17.57*** (2.691)
chidlabor_{t-1}				0.154** (0.071)
famincome	-1.032*** (0.183)	-0.783** (0.334)	0.559 (0.670)	-0.448 (0.376)
childeduc	-2.689*** (1.011)	-2.068 (1.299)	-0.801 (1.382)	-0.924 (1.353)
familysize	-0.817* (0.480)	-0.827 (0.821)	-0.0693 (0.795)	-1.503* (0.823)
urban	-1.596*** (0.386)	-1.701*** (0.444)	-0.615 (0.707)	-1.563** (0.747)
unemp	-0.692*** (0.078)	-0.500*** (0.108)	-0.0485 (0.144)	-0.329** (0.140)
mothereduc	-0.674* (0.391)	-0.983 (0.607)	-2.198 (1.460)	-1.548*** (0.526)
inspect	-0.0594*** (0.016)	-0.0579*** (0.020)	-0.0452** (0.022)	-0.0478* (0.025)
PBF	-0.161*** (0.054)	-0.159** (0.065)	-0.254 (0.159)	-0.125** (0.060)
<i>N</i>	207	207	207	207
<i>R</i> ²	0.783		0.536	

Note: Standard errors in parentheses; ***, ** and * denote significance at 1%, 5% and 10%, respectively; All variables, both the response variable and its regressors, are logarithmized; The constant term is the average effect of state unobservables; *N* is the number of observations.

Despite the FE and RE models account for unobservables, the treatment given

by both differ. As to the FE model, the unobserved effects, α_i , are eliminated by mean-differencing, since they are assumed to be time-invariant. Thus Eq. 3.22 is transformed in

$$(\text{chidlabor}_{it} - \overline{\text{chidlabor}}_i) = (\mathbf{x}_{it} - \bar{\mathbf{x}}_i)' \beta + (\varepsilon_{it} - \bar{\varepsilon}_i). \quad (3.23)$$

Compared to the OLS model, the consistency of β in the FE model requires a weaker assumption that $E(\varepsilon_{it}|\alpha_i, \mathbf{x}_{it}) = 0$. In other words, the time-invariant component, α_i , of the composite error, u_{it} is permitted to correlate with regressors.

An extended version of the FE model was provided in the Stata software, where Eq. 3.23 is written as follows

$$(\text{chidlabor}_{it} - \overline{\text{chidlabor}}_i + \overline{\overline{\text{chidlabor}}}) = (\mathbf{x}_{it} - \bar{\mathbf{x}}_i + \bar{\bar{\mathbf{x}}})' \beta + (\varepsilon_{it} - \bar{\varepsilon}_i + \bar{\bar{\varepsilon}}) \quad (3.24)$$

whereby $\bar{\bar{\mathbf{y}}}$, $\bar{\bar{\mathbf{x}}}$ and $\bar{\bar{\varepsilon}}$ are grand mean of \mathbf{y}_{it} , \mathbf{x}_{it} and ε_{it} , respectively. The advantage of this extension is that an intercept estimate and its respective level of significance are provided, which is the average of unobservables, α_i .

The Random Effect model (RE) is quite similar to the Fixed effect model (FE) in the sense that it admits and controls α_i . However, in the RE model α_i is assumed to be purely random and not permitted to correlate with regressors, i.e., $E(\varepsilon_{it}|\alpha_i, \mathbf{x}_{it}) = E(\varepsilon_{it}|\mathbf{x}_{it}) = 0$. The results for both models are presented in columns FE-I and RE-I, respectively.

To statistically back up the abandon of the pooled OLS model, the F -test and the Breusch and Pagan Lagrange-multiplier test were carried out. The former tests between FE model and pooled OLS model, whilst the later tests between the RE model and pooled OLS model. With a F -test value of 5.62 we reject the null hypothesis of the nonexistence of unobservable state time-invariant effects, α_i . Likewise, having a value of $\bar{\chi}^2 = 30.11$ for the Breusch and Pagan Lagrange-multiplier test, we reject the hypothesis that $\text{var}(\alpha_i) \neq 0$. This confirms that it is, indeed, important to control for time-invariant unobserved factors.

To choose between the FE and RE models, the Hausmann test was performed. With a test value of 36.52, we reject the null hypothesis of no correlation between regressors and state unobservables. Therefore, the RE model was abandoned for the FE model.

Ramalho e Mesquita (2013), using 2001–2009 PNAD data to estimate dynamic panel data models, affirmed the existence of temporal dynamics of child labor rate in Brazil. However, the models estimated till now do not permit the inclusion of lagged dependent variable as regressor. Following the steps of these authors, as per the control for temporal dynamic, we used the System Dynamic Panel-Data Estimator (henceforth,

GMM). Thus, our dynamic model of order 1 in chldlabor_{it} is represented as

$$\text{chldlabor}_{it} = \gamma_1 \text{chldlabor}_{i,t-1} + \mathbf{x}'_{it} \beta + \alpha_i + \varepsilon_{it}, \quad t = 1, \dots, T \text{ and } |\gamma| < 1 \quad (3.25)$$

Aside providing consistent estimates for γ_1 and β , the Arellano-Bond estimator accounts for endogenous regressors. In model 3.25, \mathbf{x}_{it} can be treated as exogenous or endogenous. Exogenous regressors are those which are uncorrelated with ε_{it} , they require no special treatment and are used as instrument for themselves. As to endogenous regressors, $E(\mathbf{x}_{it} \varepsilon_{is}) \neq 0$ for $s \leq t$ and $E(\mathbf{x}_{it} \varepsilon_{is}) = 0$ for $s > t$. However, such variables can be instrumented using their lagged values. Moreover, due the moment condition that $E(\Delta \mathbf{y}_{1,t-1} \varepsilon_{it}) = 0$, the GMM also permits to use $\Delta \text{chldlabor}_{1,t-1}$ as instrument (ARELLANO; BOVER, 1995; BLUNDELL; BOND, 1998). For this essay, we use all possible lags of endogenous variables as instruments, but we limited lags of the response variable to the maximum of two. The reason for this is that, according to Cameron e Trivedi (2010), the use of too many instruments for GMM estimator may cause poor performance of asymptotic results.

The results obtained from the initial dynamic model are presented in column GMM-I of Table 3. The variables considered exogenous in this model are **unemp**, **familysize**, **mothereduc** and **urban**. The reason for this is that the decision of a child to work does not determine neither of these variables at state level. On the contrary, the variables which we consider as endogenous are **famincome**, **gini**, **childeduc**, **PBF** and **inspect**.

The **famincome** variable is suspected to be endogenous based on observation made by Psacharopoulos (1997) and Basu (1999) that in extremely poor families, children tend to be sole contributors to households income. In this sense, the endogeneity of the average per capita family income tends to be high if the child's income has significant weight in the family income. Despite the debate concerning the conciliation of work and schooling by a child, the simultaneous relationship between child labor and child education is in consensus in literature (BASU, 1999; DESSY; PALLAGE, 2001; RANJAN, 2001; DAS; DEB, 2006). Therefore, the proportion of enrolled children is potentially endogenous. However, such endogeneity is reduced if most children conciliate schooling and work as observed by Kassouf (2002) and Kassouf (2015).

The government variables **PBF** and **inspect** are suspected to be highly endogenous. Specifically, the number of Labor Inspections conducted in a specific region depends on the number of complaints filed about the use of child labor in the region. Similarly, the amount of money transferred by the PBF to a certain region depends on the level of poverty of the region which, in turn, determines the number of children working.

Arellano e Bover (1995) instructed that ε_{it} must be serially uncorrelated in order to obtain consistent estimation of parameters. Formally, $\Delta \varepsilon_{it}$ are correlated with $\Delta \varepsilon_{i,t-1}$, because $Cov(\varepsilon_{it}, \varepsilon_{i,t-1}) = Cov(\varepsilon_{it} - \varepsilon_{i,t-1}, \varepsilon_{i,t-1} - \varepsilon_{i,t-2}) = -Cov(\varepsilon_{i,t-1}, \varepsilon_{i,t-1}) \neq 0$,

however, $\Delta\varepsilon_{it}$ will not correlate with $\Delta\varepsilon_{i,t-k}$ for $k \geq 2$. Loosely speaking, the first-differenced errors, $\Delta\varepsilon_{it}$, are correlated in the AR(1) but not in subsequent orders. The statistic test that verifies this assumption is the Arellano-Bond test. The null hypothesis of this test is that there is no autocorrelation in the first-differenced errors. Another test used to verify if the dynamic panel model is misspecified is the Sargan test of overidentifying restrictions. It is important to note that this test assumes that errors are independent and identically distributed (i.i.d), thus the Sargan test cannot be run on the heteroskedastic-robust errors.

The Sargan test of overidentifying restrictions was performed on the GMM-I model to verify if the instruments are valid. The model is considered overidentified because 189 instruments were used to estimate 10 parameters, hence there were 179 overidentifying restrictions. Having that the Sargan test assumes strict homogeneity of error, we apply this test on the regular standard errors of the model. The value of this test was 209.87 with a p -value of 0.057, implying that we do not reject the null hypothesis that overidentifying restrictions are valid at a level of 10%. Note that Arellano e Bond (1991) pointed that the Sargan test overrejects in the presence of heteroskedasticity. This might be the reason for the relatively low p -value, since there is clear evidence of heteroskedasticity as observed in previous models.

Subsequently, the Arellano-Bond test for zero autocorrelation in first-differenced errors was performed since the GMM estimator requires that ε_{it} to be serially uncorrelated. Therefore, we expect to reject the null hypothesis of no correlation at the first order but not at higher orders. The test value observed was $z = -3.57$ and p -value 0.004 at first order and $z = 0.92$ and p -value 0.3557 at second order. Hence, the null hypothesis that $Cov(\Delta\varepsilon_{it}, \Delta\varepsilon_{i,t-k}) = 0$ is rejected at a level of 1%, i.e, error ε_{it} is serially uncorrelated.

At this point, we conclude that the GMM estimator best fits the objective of this essay. In short, it permits to account for time dynamics, unobservable time-invariant factors and also to control potential endogeneity caused by the loop of causality between the child labor rate and its determinants.

Henceforth, the model GMM-I will be regarded as our benchmark model and all empirical results of this essay will be based on this model and its variations.

3.4 Descriptive Analysis

Brazil has recently been cited as international example in the quest of combating child labor due to the expressive reduction observed during the last decade. As portrayed in Fig. 5, the rate of child labor in Brazil presented a downward trend from 2004 to 2013. Compared to 2004, slight increase of about 0.4 p.p. was observed in year 2005. However, as from 2005 the rate of child labor plummeted expressively until year 2013. Rumor has

it that this reduction is, mainly, due to the rise of a bigger welfare state marked by the launch of the PBF program together with other social programs. Roughly, from 2004 to 2013, the Brazilian government was able to cut the rate of child labor in half.

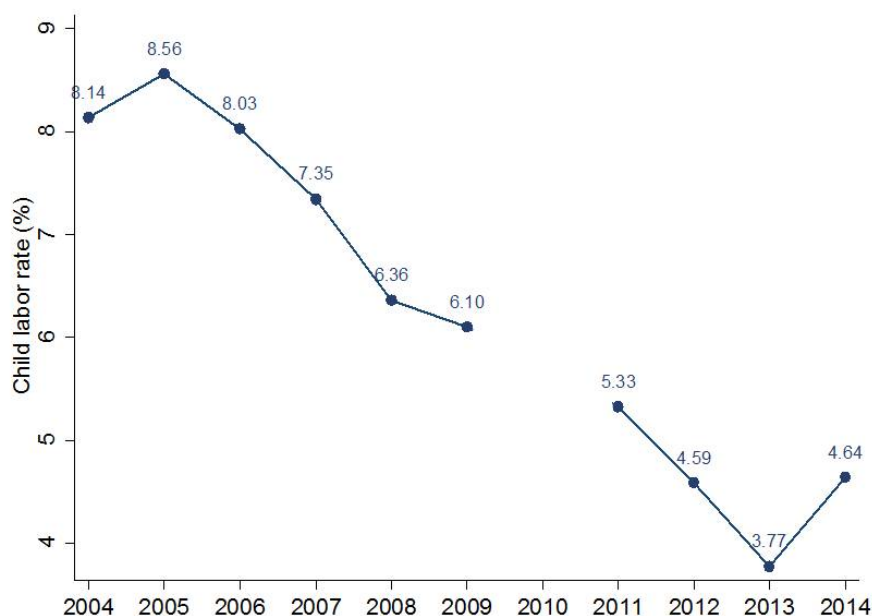


Figure 5 – Percentage of child labor, 2004 – 2009 and 2011 –2014, Brazil.

Source: Prepared using PNAD data

Notwithstanding the favorable scenario witnessed during the last decade, the passage from 2013 to 2014 was marked by an abrupt increase of about about 0.9 p.p. in the rate of child labor. Although studies are yet to point to the potential causes of this increase, some believe it was simply a temporal fluctuation while others believe it to be an aftermath of the current economic crises. The latter public opinion seems more convincing since unemployment is on the rise and inflation has made most families to loose purchasing power, thus leading to the usage of child labor to bolster family income. If indeed economic crises caused increase of child labor, economic performance has to be taken into account as potential determinant of child labor.

Urban-Rural Differences

In spite of the reduction of the child labor rate, Brazilian child labor experts point to a new challenge, which is that of the reduced intensity of the reduction of child labor. This novel scenario can be clearly observed in Fig. 6, which decomposes the rate of child labor in rural and urban areas. The first observation from this figure is the preeminence of the rate of child labor in the rural areas compared to the urban areas. Comparatively, the rate of child labor in rural areas was about four times the rate in urban areas in 2004 and about three and half times in 2014. Such preeminence may be explained, partly, by

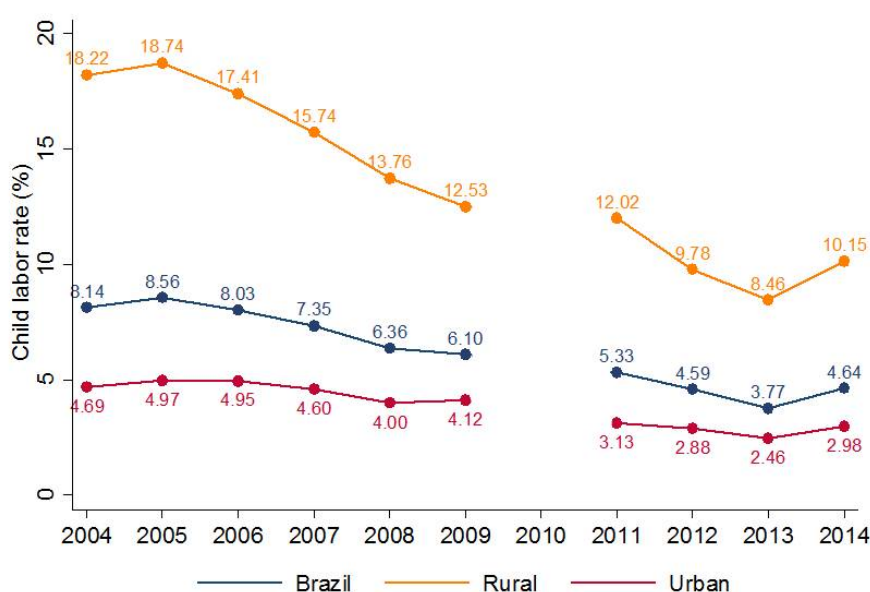


Figure 6 – Percentage of child labor rate classified by rural and urban areas, 2004 – 2009 and 2011 – 2014, Brazil.

Source: Prepared using PNAD data

the level of poverty, dominance of agricultural activities and difficulty of inspection in the rural areas.

Aside comparative proportions of both areas, a more curious observation is the evolution of these proportions. Ignoring the recent chock, one clearly observes that the rate of child labor in the rural area reduced more sharply compared to that of the urban areas. This perception induces to conclude that the expressive reduction of child labor rate in Brazil is driven, mainly, by the reduction observed in the rural areas. This perception is supported by the coincidence of acute increase observed for rural areas and Brazil as a whole, but not for urban areas.

In light of this observation, the following precipitant question prompts: is the passiveness of the child labor rate, especially, in the urban areas related to what Brazilian child labor experts and the ILO refer to as the ‘hard core’ (*núcleo duro*, in Portuguese) of child labor? In order to answer this question such core has to be defined.

According to CONAETI (2011)¹² and Rosado e Luciana (2014)¹³, the ‘hard core’ of child labor is a state of the problem where its eradication becomes more difficult, and demands new strategic actions. In other words, at this state the set objective to eliminate all forms of child labor until 2020 becomes more challenging. These reports also made clear that this state becomes more evident in the worst forms of child labor such as those observed in family agriculture, urban informal sector, illegal activities and domestic child

¹² National plan of the prevention and elimination of child labor and protection of adolescent worker.

¹³ Final report of the parliamentary commission for inquiry concerning child labor.

labor.

Poverty

In order to verify the extent at which poverty really explains child labor, Fig 7 and 8 present the classification of child laborers by their monthly family income per capita for year 2004 and 2014¹⁴. It is noteworthy to emphasize that the analysis of these proportions is exclusively concerning child laborers and not comparative to non-child laborers. Moreover, the class intervals were strategically chosen to account for the extreme poverty lines (R\$ 69 and R\$ 77 per capita for year 2004 and 2014, respectively), poverty lines (R\$ 137 and R\$ 154 per capita for year 2004 and 2014, respectively) and minimum wage levels (R\$ 260 and R\$ 745 for 2004 and 2014, respectively). These same poverty and extreme poverty lines were used to stipulate the eligibility of families in the PBF conditional cash transfer program in both years. Having that the major objective here is to verify the relationship between family income levels and the incidence of child labor, the few cases of negative net family income were ignored¹⁵.

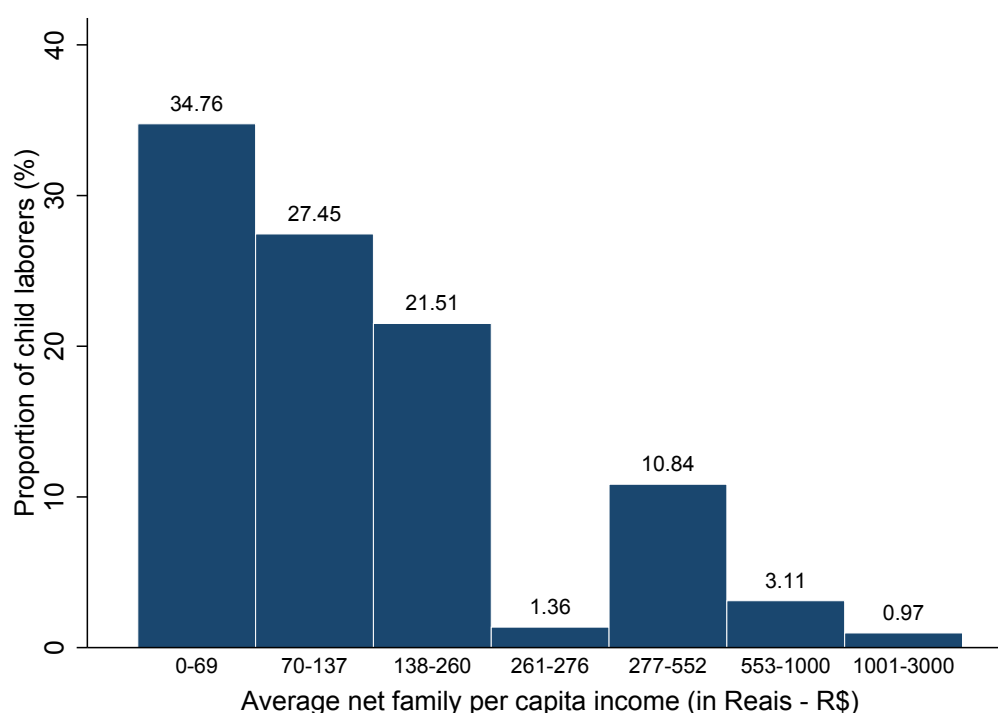


Figure 7 – Percentage of child labor by average family income, 2004 and 2014, Brazil.

Source: Prepared using PNAD data.

Note: Income of children and adolescents were deducted from total family income.

¹⁴ Note that the average family income presented does not include children's income. Thus only adults' income and legal income of adolescents in apprenticeship were considered.

¹⁵ There were only cases of negative net family income for families without working adults or for cases in which childrens' income exceeds total income of adults from the same family, however, such cases were few.

For year 2004, we observe that about 35% of child laborers were from extremely poor families, while about 27% were from poor families. In other words, about 62% of child laborers were from families below the poverty line. Moreover, it is observable that the proportion of child laborers from families with average family income per capita between the poverty line and the minimum wage is lower compared to anterior class interval. Taking into account the relative amplitude of each class interval, one can deduce that the proportion of child laborers reduced as the family income per capita increases. Therefore, our overall conclusion is that the distribution of child labor by family income levels is skewed right, thus, the positive relationship between family poverty and child labor is more evident.

An overview of the same exercise for year 2014 prompts curiosity, especially concerning the distribution which seems normal and not skewed right as observed for year 2004. Specifically, in year 2014, only about 6% of child laborers were from extremely poor families, while about 13% were from poor families. Cumulatively, only about 19% were from families below the poverty line. It is, however, reasonable to imagine that this poverty line is very low, so we double the poverty line (value of R\$ 308). Still, more than half of the child laborers (about 55%) were not from poor families in 2014. Amplifying the poverty line further, we assumed that each member of the family (including adults and children) earns the minimum wage (value of R\$ 742). Yet, almost 20% of the child laborers continue working. At this extent, the underestimation of the poverty line, better still, the financial capacity of the family to cover subsistence consumption is not the question. Thus, the relationship between poverty and child labor in Brazil might truly be getting weaker as showed in Table 1 and as argued in the report published by Repórter Brasil (2013). Moreover, such persistence may also be due to the culture of child labor presented in Chapter 2.

Such a change in the profile of child laborers from 2004 to 2014 may have severe implications on the effectiveness of government social programs to reduce child labor. The PBF, for example, has its coverage highly limited concerning child labor in 2014 since only poor and extremely poor families can participate. Nevertheless, we must recognize that reduction of child labor is not the primary objective of the program. Although not our focus here, it is worthwhile to remind that the PETI program attends families above the poverty line. However, we believe that the value transferred to families in this program is too low to attract participation since such families are not poor and children are offered higher values in the informal labor market, even though subjected to unfair working conditions.

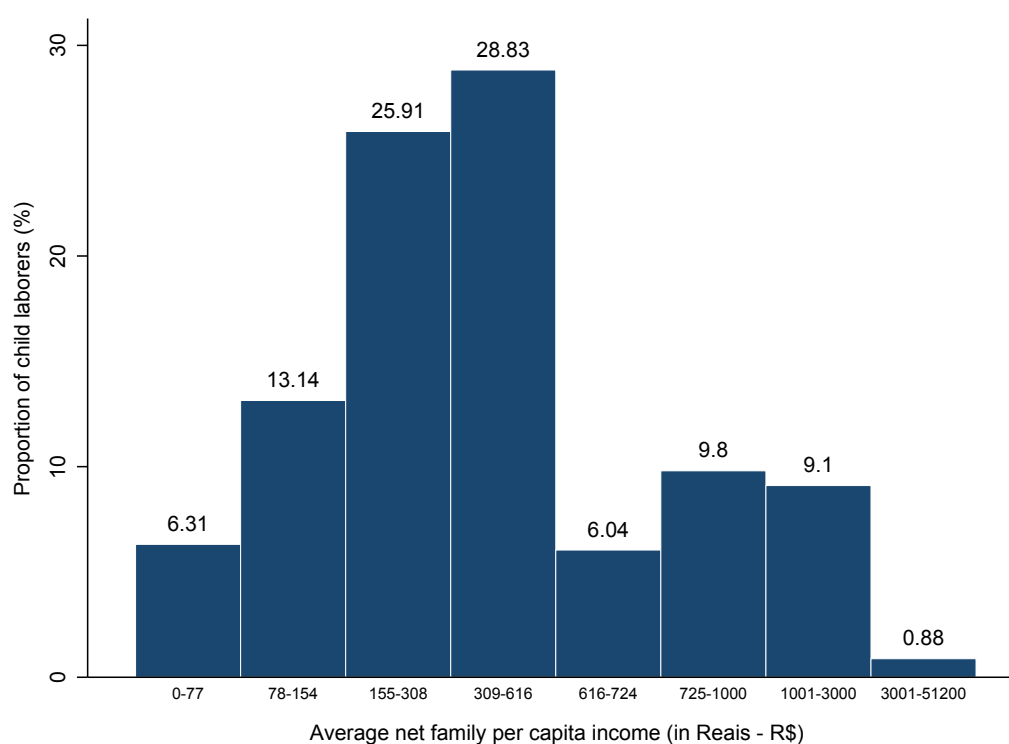


Figure 8 – Percentage of child labor by average family income, 2004 and 2014, Brazil.
Source: Prepared using PNAD data.

Note: Income of children and adolescents were deducted from total family income.

Sectoral Distribution

Fig. 9 illustrates the sectoral distribution of child labor in 2004 and 2014. The economic sectors considered comprise activities regarding agriculture, industry, construction, trade and repair and services. We intentionally separated domestic services from other services to pay focal attention. In accordance with most national and international studies, it is perceptible that the agricultural sector is the major employer of child labor. However, the participation of the agricultural sector reduced significantly over time.

Specifically, in 2004 about 53.3% of the child laborers were working in the agricultural sector, while in 2014 this proportion reduced to 46.5%. The trade and repair sector, which is second to agriculture, was responsible for the employment of 18.1% of the child laborers in 2004 and 19.8% in 2014. The rate of child labor in the service sector is quite similar to that of the trade sector. However, separate analysis of domestic services show that a expressive portion of the children in the service sector are domestic workers. The sector with the least employment of children and adolescents, in both years, was the industrial sector.

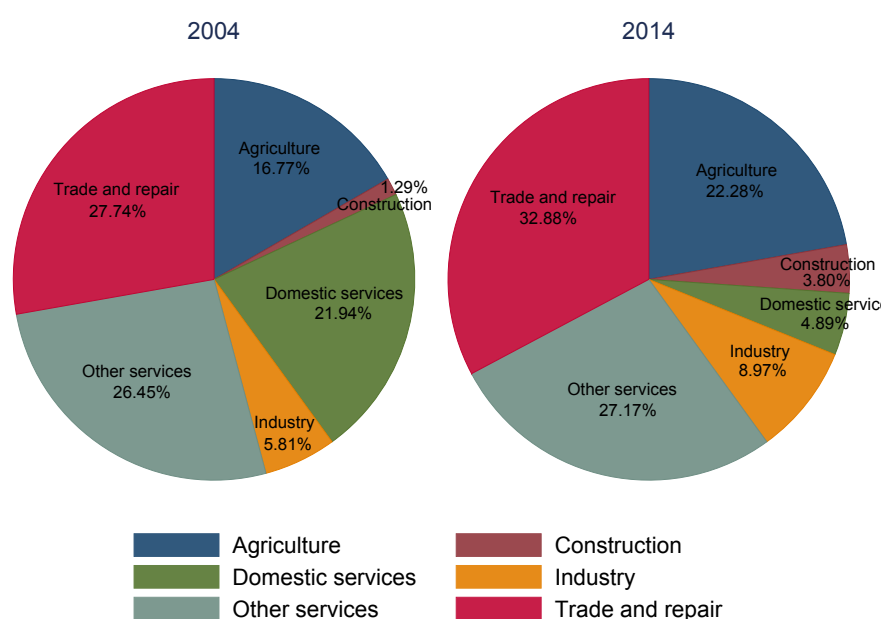


Figure 10 – Sectoral distribution of non-poor child laborers, 2014, Brazil.
Source: Prepared using PNAD data

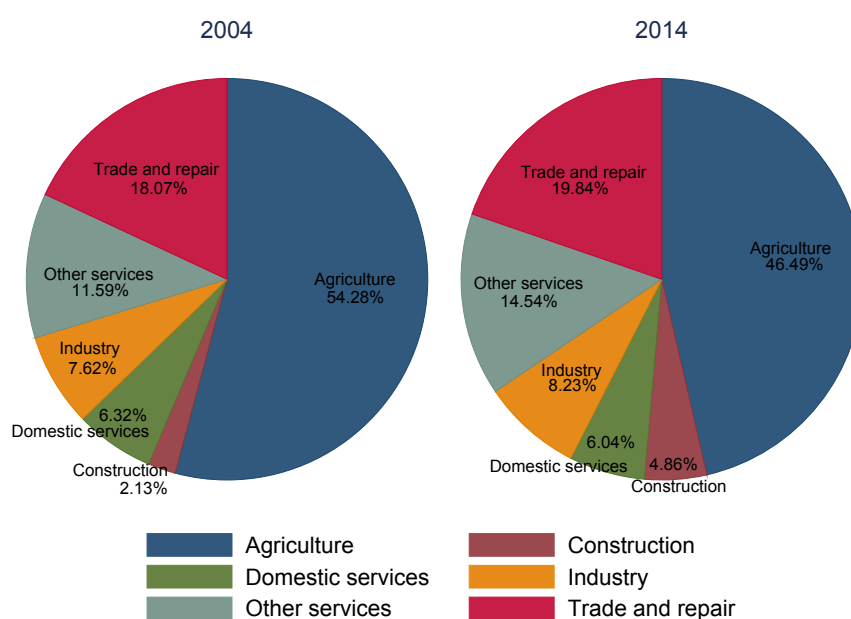


Figure 9 – Sectoral distribution of child labor, 2004, Brazil.
Source: Prepared using PNAD data

For the sake of inquisitiveness, Fig. 10 presents the sectoral distribution of child labor considering those from families with average family income above the minimum wage.

It is perceptible that these specific child laborers, who do not fit in the conventional poverty doctrine, have peculiarities in the sense that they have certain preference for the

service and trade sectors in both years. It is also interesting to observe that about 22% of these children work in domestic activities in 2004, whereas this proportion was reduced to 5% in 2014. This may indicate, intuitively, that these children developed lesser preference for domestic activities, which are generally not remunerated, and higher preference for other activities, which are generally remunerated. If true, compared to 2004, children from non-poor families preferred to work outside their homes in 2014. This should be alarming to Brazilian child labor experts in the sense that these children are leaving relatively non-hazardous activities to those which are, in most cases, time consuming and stressful¹⁶.

Spatial Distribution

Fig. 11 and 12 illustrate the spatial distribution of child labor in Brazil in 2004 and 2014, respectively. As presented earlier, the percentage of child labor reduced significantly in Brazil as a whole during the referred period. However, this tendency was not observed in all state.

First, one clearly observes the concentration of higher rates in the Northern and Northeast compared to other regions. This is partly justifiable by the socioeconomic characteristics of these regions in terms of poverty level, urbanization rate and preeminence of the agricultural sector. Comparing the map of year 2004 to that of 2014, one perceives a slight homogenization of the rates of child labor in 2014. Comparison of the rates indicates that such homogenization is due to higher reduction of child labor in the Northern and Northeast regions, and lower reduction in the Southern and Southeast regions.

The states with the highest rates of child labor in 2004, in reducing ranking order, were: Piauí, Rondônia, Maranhão and Pará. In the same year, the lowest rates were observed for (in increasing ranking order): the Federal District, Rio de Janeiro, Amapá and São Paulo. Analogously for the year 2014, the states of Piauí, Pará, Acre and Maranhão had the highest ranks, while the states of Rio de Janeiro, São Paulo, Amapá and the Federal District had the lowest rates. A more interesting observation is the evolution of these rates. Impressively, the states of Pernambuco, Alagoas, Rondônia and Ceará were able to drastically reduce the rate of child labor from 2004 to 2014. The most alarming observation during this period was the increase of 25.1% in the state of Sergipe and of 124% in the Federal District.

Still, the comparison of the values from both periods buttresses the observation illustrated in Fig. 6 regarding the higher responsiveness of child labor in less developed regions (North and Northeast) to reductions along time compared to relatively developed regions (South and Southeast). Such responsiveness also supports the observation made in the report published by Repórter Brasil (2013) that despite child labor in urban areas

¹⁶ This is only true if the assumption that domestic activities in relatively non-poor families are less time occupying and stressful.

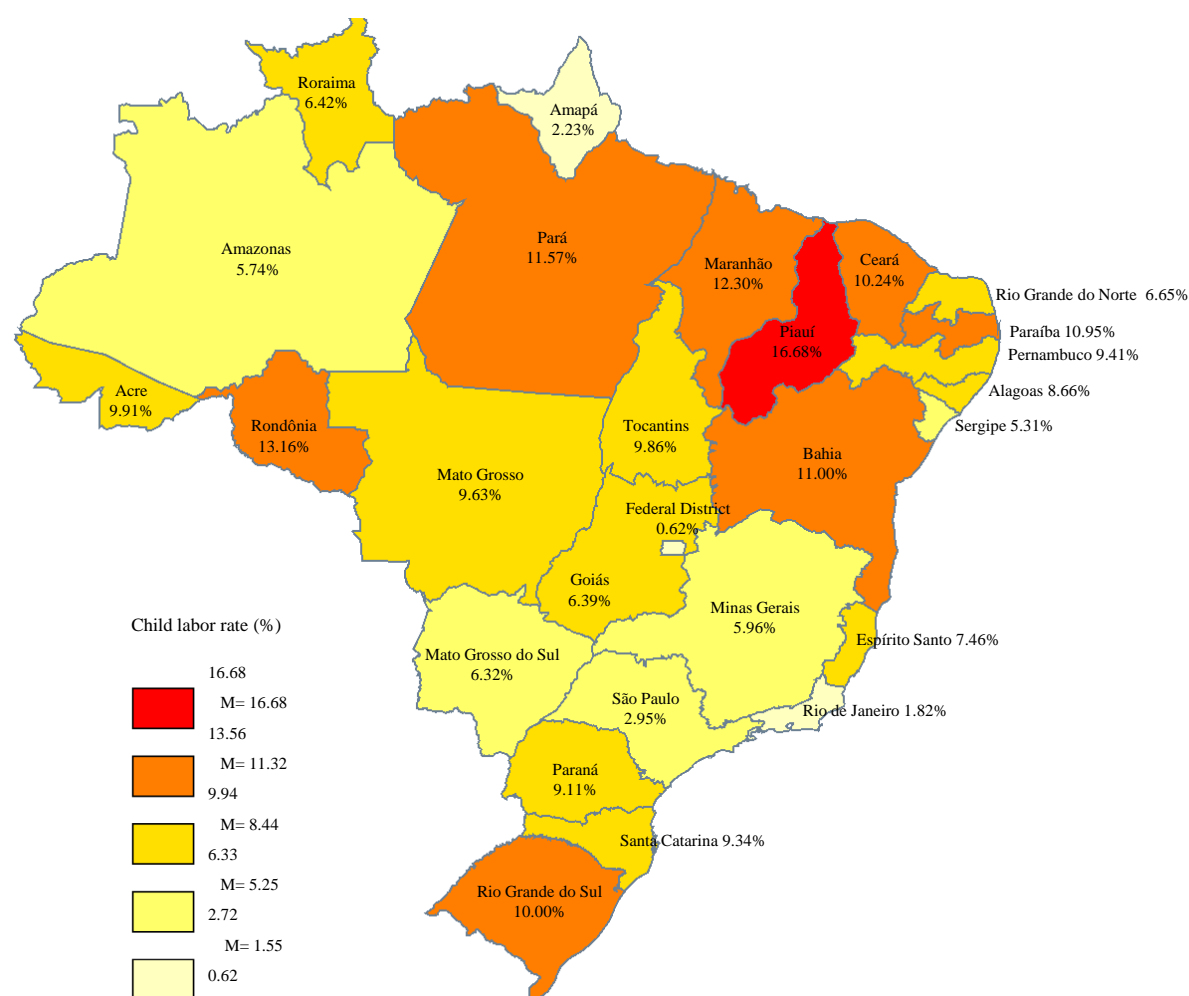


Figure 11 – Percentage of child labor, 2004, Brazil.

Source: Prepared using PNAD data.

Note: M denotes mean of child labor rate within interval.

being more visible it is the most difficult to eradicate. According to this report, this is because the Brazilian urban society passively accepts child labor in cases such as that of children who sell candies in traffic, those who help in carrying luggage in market fairs and even those involved in street performances or display.

Bolsa Família

Shifting to governmental policies to reduce child labor. As presented in Section 3.2, some of the primary measures adopted by the Brazilian government to reduce child labor are the PBF program and the Labor Inspection with focus on child labor. Inasmuch as we focus our analysis on maps, exact values are presented in Table 4.

Fig. 13¹⁷ illustrates the geographic distribution of the PBF benefit among states in 2004 and 2014. Specifically, the number of families attended by the program is represented

¹⁷ These maps are not labeled in order not to pollute the figures. For identification of the Brazilian states refer to Fig. 11 or 12.

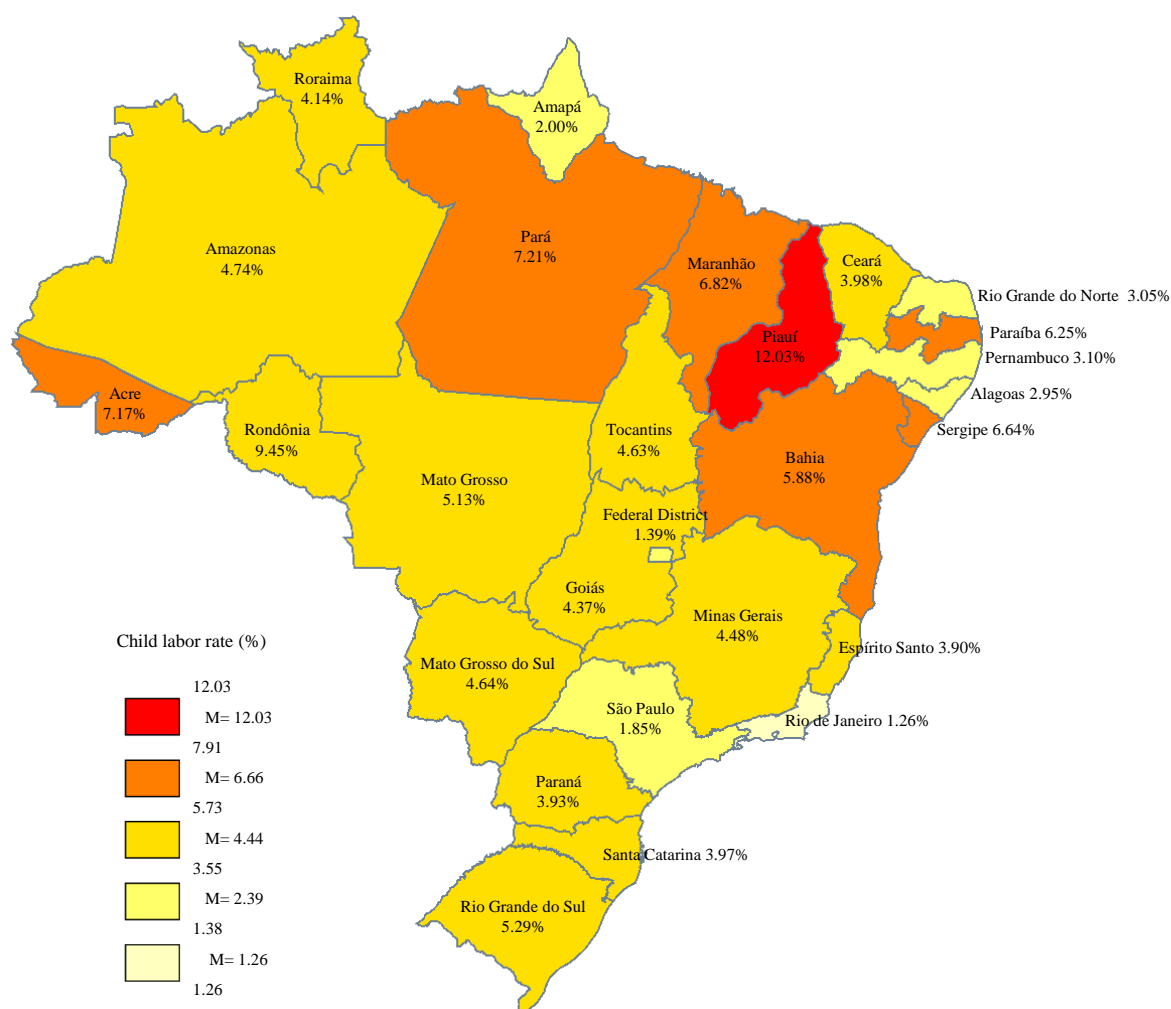


Figure 12 – Percentage of child labor, 2014, Brazil.

Source: Prepared using PNAD data.

Note: M denotes mean of child labor rate within interval.

Table 4 – Coverage of the Labor Inspection and *Bolsa Família* program, Brazil.

State	CL2004	CL2007	CL2014	Inspect2007	Children2007	Inspect2014	Children2014	PBF2004	PBF2014
Rondônia	13.16	9.45	4.55	1	34	73	34	54,942	114,170
Acre	9.91	10.07	7.17	2	59	239	56	28,851	78,561
Amazonas	5.74	5.36	4.74	4	36	150	102	104,135	358,516
Roraima	6.42	5.86	4.14	46	0	105	67	14,522	48,104
Pará	11.57	8.52	7.21	23	112	290	105	259,641	887,426
Amapá	2.23	3.21	2	4	58	65	133	10,256	55,527
Tocantins	9.86	10.17	4.63	13	152	431	21	55,305	139,295
Maranhão	12.30	13.28	6.82	18	966	75	33	380,742	985,136
Piauí	16.68	11.13	12.03	8	17	317	85	217,931	456,811
Ceará	10.24	9.49	3.98	251	1,779	47	179	572,730	1,089,813
Rio grande do norte	6.65	9.23	3.04	3	9	260	217	190,116	362,805
Paraíba	10.94	8.06	6.24	31	148	8	70	273,135	524,967
Pernambuco	9.41	8.75	3.10	1	17	617	1,029	518,956	1,150,879
Alagoas	8.65	8.23	2.95	52	390	161	138	214,726	439,655
Sergipe	5.30	6.12	6.64	26	154	236	373	113,147	281,231
Bahia	10.99	9.32	5.87	42	751	701	340	838,963	1,808,376
Minas gerais	5.96	6.36	4.47	91	191	1,286	347	756,335	1,143,020
Espírito santo	7.46	5.51	3.90	2	3	222	25	120,911	190,049
Rio de janeiro	1.82	1.87	1.26	24	190	1,130	189	196,330	827,847
São paulo	2.95	2.76	1.84	42	109	283	182	657,099	1,327,024
Paraná	9.11	8.17	3.93	25	50	46	48	308,754	406,918
Santa catarina	9.39	8.17	3.97	32	64	226	80	101,247	137,970
Rio grande do sul	10	7.99	5.29	43	132	582	268	290,660	434,715
Mato grosso do sul	6.32	6.92	4.64	108	332	614	485	32,588	145,224
Mato grosso	9.63	7.38	5.13	26	43	453	305	82,116	186,272
Goiás	6.39	5.37	4.37	30	232	879	514	135,758	336,606
Distrito federal	0.62	1.57	1.39	33	89	302	100	41,943	86,524

Source: Prepared using data from PNADs, Ministry of Labor and Employment (MTE) and Ministry of Social Development (MDS).

Note: CL2004, CL2007 and CL2014 denote child labor rate in 2004, 2007 and 2014, respectively; Inspect2007 and Inspect2014 denote the number of Labor Inspections conducted in 2007 and 2014, respectively; Children2007 and Children2014 denote the number of child laborers withdrew from work during Labor Inspections in 2007 and 2014, respectively; PBF2004 and PBF2014 denote the number of beneficiaries of the PBF in 2004 and 2014, respectively.

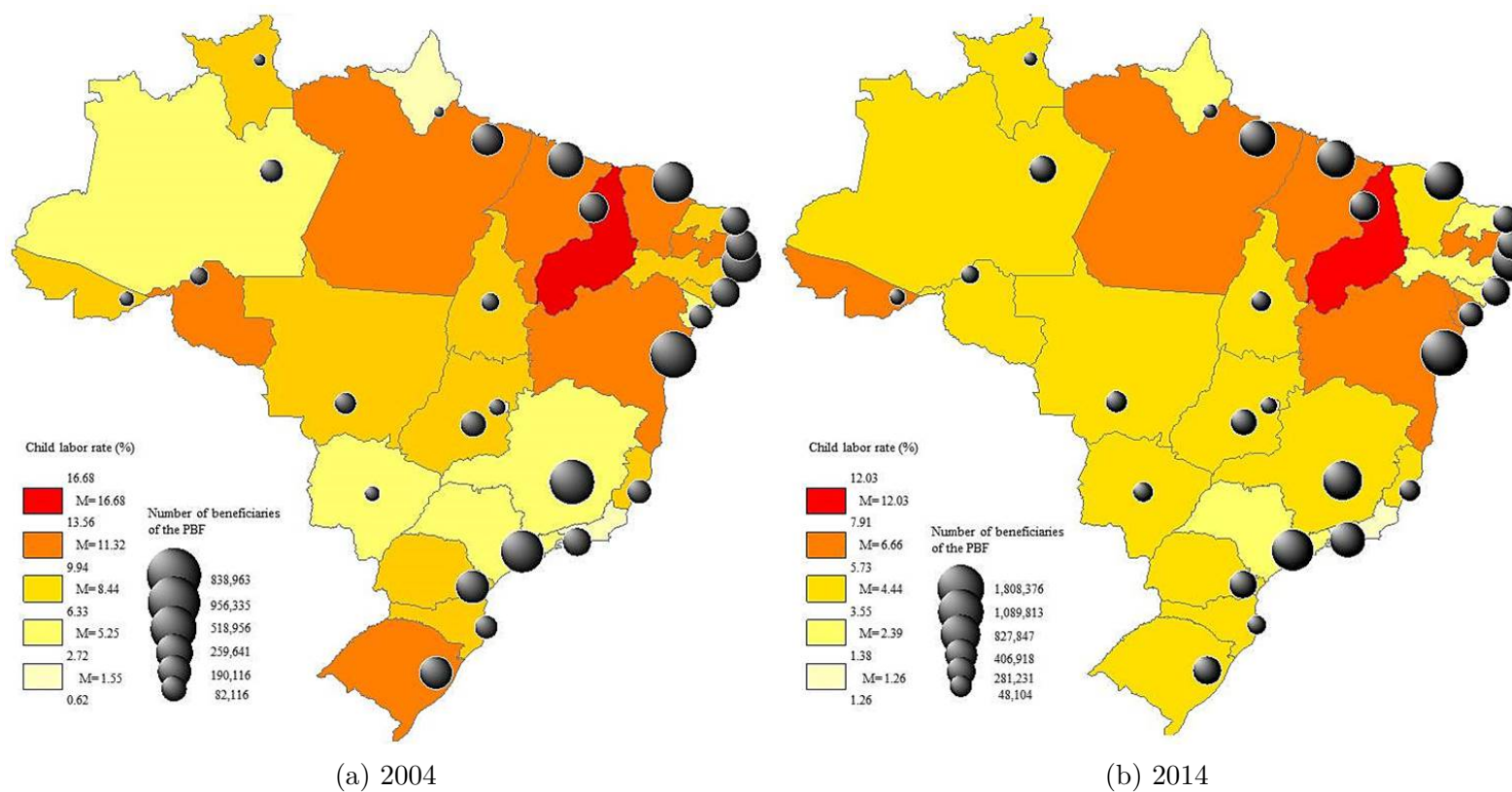


Figure 13 – Rate of child labor and the number of families covered by the PBF program, 2004 and 2014, Brazil.

Source: Prepared using PNAD and the Ministry of Social Development (MDE) data

Note: M denotes mean of child labor rate within respective interval.

by the size of the spheres positioned on the maps of each state. The initial observation from Fig. 13a and 13b is that of similar allocation of the PBF benefits in 2004 and 2014. Generally, we observe concentration in the Northeast and Southeast regions.

Comparing with child labor rate, a clear positive correlation is observable between the color density of the map and the size of the spheres. However, this correlation does not accompany significant changes in child labor rate from 2004 to 2014. Take for example, the state of Acre that has one of the highest rates of child labor but participate modestly in the program, compared to São Paulo which has the lowest rate of child labor but is one the most privileged by the PBF program. Moreover, it is notable that the rate of child labor and the coverage of the PBF program went on different directions in the state of Sergipe and in the Federal District. Based on these maps, it is perceptible that the main objective of the program is quite distant from directly reducing child labor. However, one can not be too demanding since the program only combats child labor though one of its conditionalities.

As mentioned in Section 3.2, the PBF program only attends families with average income per capita below the poverty line, giving priority to extremely poor families. Now recall that in Fig. 7 and 8, we observed that about 62% of the child laborers were from families below the poverty line in 2004, whereas only about 19% fell into the same classification in 2014. Thus, according to the poverty conditionality stipulated by the PBF program, about 31% and 81% of child laborers were not eligible to participate in the cash transfer program in 2004 and 2014, respectively.

At this point, it becomes unsurprising why empirical studies hardly find effectiveness of the program on child labor, especially for recent years (see Araujo *et al.* (2010), Cacciamali *et al.* (2010), Nascimento (2013)).

Labor Inspection

Fig. 14 and 15 present the geographical distribution of the number of Labor Inspections conducted with focus on child labor and the number of children who were effectively withdrawn from work in 2007 and 2014. Therefore, in each figure there are two subfigures – one for Labor Inspection coverage and the other for its effectiveness in reducing child labor. We recognize that, according to ILO/SIT (2010), the effectiveness of the Labor Inspection should not be exclusively measured by the number of children withdrawn, but also take into account the awareness-raising activities. However, the effect of such activities is contrafactual.

Even though the Labor Inspection activities were conducted in all state, in Fig. 14, one observes concentration in specific states. Similarly to the PBF program, we note from map (a) that the allocation of inspection activities does not really corresponds to the rate

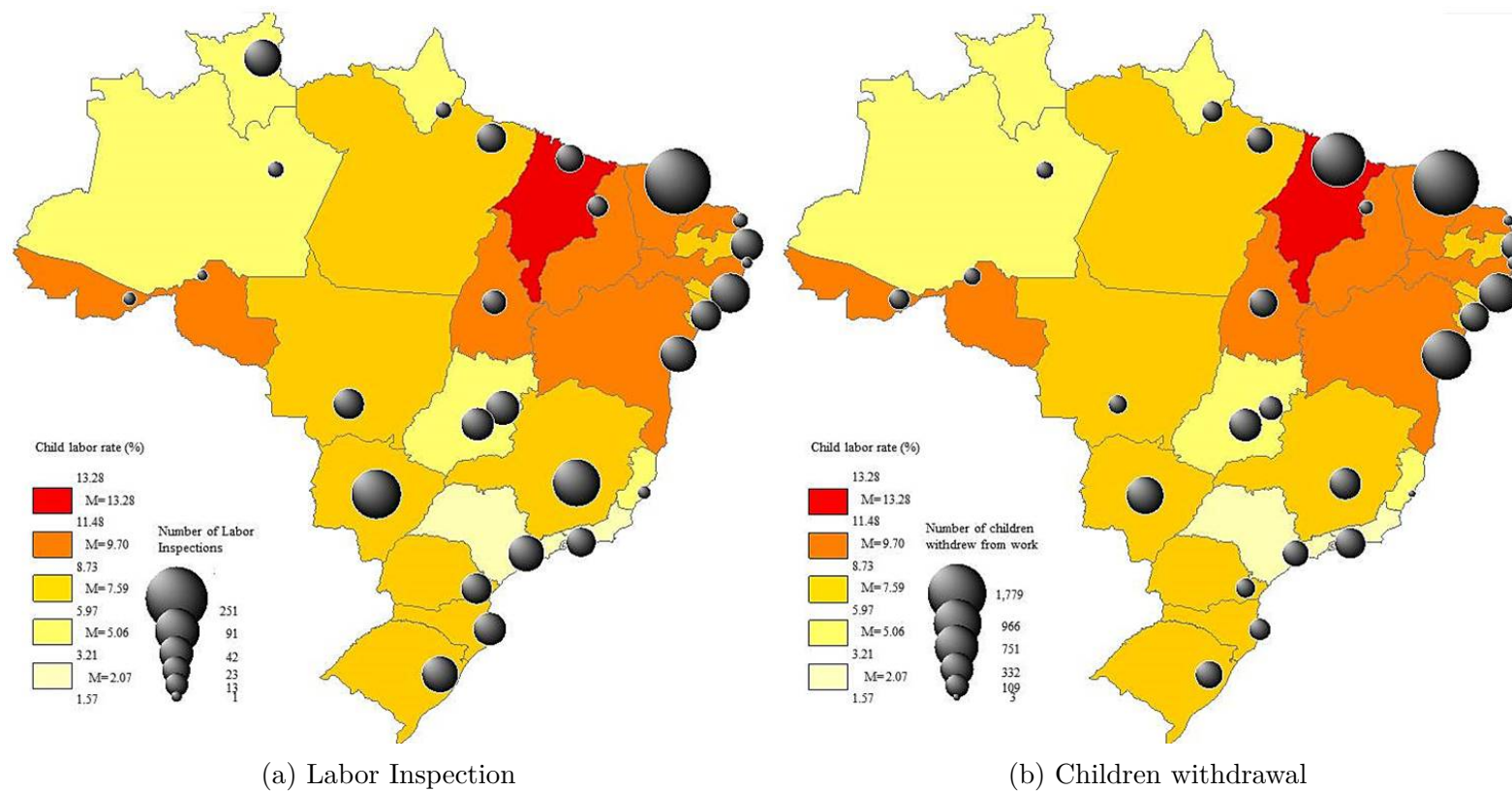


Figure 14 – Rate of child labor, number of Labor Inspections and number of children withdrew from work, 2007, Brazil.
 Source: Prepared using PNAD and Information System of Child Labor (SITI) data.
 Note: M denotes mean of child labor rate within respective interval.

of child labor in states. In 2007, the states of Piauí and Maranhão had the highest rates of child labor, but were ranked in the 20th and 18th positions concerning the number of conducted inspections. Moreover, the states of Ceará, Mato Grosso do Sul and Minas Gerais are first, second and third, respectively, as to the number of conducted inspection but are 5th 17th and 18th, respectively, as to the highest rate of child labor. In fact, one can observe that the highest rates of child labor are concentrated in the Northeast region and the lowest are observed in the Midwest and Southeast regions. However, the Northeast region is less privileged than the Midwest and Southeast regions concerning inspection allocation. In these cases, the distribution of the number of Labor Inspections among states is paradoxical since the major objective of the inspection activities is to reduce child labor.

In order to understand this paradoxical distribution one has to consider the features of the conducted inspections, the actual objectives of the program and its proper articulation with legal apparatus. Firstly, it is important to recall that the Labor Inspection depends on the reported complaints in the region. However, this does not justify the paradoxical distribution since the complaints are only part of what guides the planning process. Still on features, it is worthwhile to note that the inspectors basically visit businesses and workplaces, overlooking child labor outside organized establishments. Take for example children who work as street vendors, in family agriculture, in informal urban activities or as domestic workers or housekeepers. These types of child labor, which basically comprises the so-called ‘hard core’ of child labor, are hardly reached. Specifically, as child labor in the Northeast regions are more concentrated in family agriculture and domestic services, which are not accessible by inspectors, inspection activities tend to be concentrated in other regions where child labor is visible and accessible.

A dilemma is faced concerning the objective of the Labor Inspection: focus on child laborers in regions where the incidence is higher but invisible or on child laborers regions where the incidence is relatively low but visible. Although these alternatives are not mutually exclusive, they may end up concentrating Labor Inspection. The proper articulation of the Labor Inspection and legal apparatus determines the accessibility of inspectors in certain forms of child labor. According to the report published by Repórter Brasil (2013), the Brazilian constitutional right of inviolability of homes without judicial authorization inhibits effective access of inspectors in family environments, thus, impeding withdrawal of child laborers from family agriculture or domestic activities.

In terms of the effect of Labor Inspection on child labor, it is notable in Fig. 14b that greater number of children were withdrawn from work in the Northeast region compared to the Midwest and Southeast regions. For instance, the state of Maranhão, which had the highest rate of child labor in 2007 and was ranked in the 18th position on the inspection’s priority list, had the second highest number of children withdrawn from

work. Conversely, the states of Mato Grosso do Sul and Minas Gerais, which had lower child labor rates but were highly prioritized for inspection were not even on the top list of states which reduced child labor as a result of inspections.

In Fig. 15, the first observation is that of generalized increase in the number of inspection activities in 2014. It is vivid that the number of Labor Inspections increased more in the Midwest, Southeast and Southern regions compared to others. Still, in 2014, none of the states with the highest rate of child labor, except Pernambuco, was prioritized on the inspection allocation list. In other words, the negative correlation between the rate of child labor and the number of inspection activities, which was observed in 2007 persisted in 2014. However, we note that despite the concentration of Labor Inspections in the Southern and Southeast regions, the Labor Inspection continued more effective in reducing child labor in the Northeast region.

Compared to the PBF program, we believe that the Labor Inspection with focus on child labor has greater potential in reducing child labor. This is because the later pays special attention on child laborers and not merely on poor people. In addition, apart from withdrawing children from work and giving them adequate assistance, the Labor Inspection conducts preventive actions against child labor through awareness creation of the consequences of child labor. However, the Labor Inspection still faces limits due to the features of its activities and the accessibility of inspectors in certain forms of child labor.

3.5 Analysis of Empirical Results

The hypothesis which we analyze in this section is that *Bolsa Família* cash transfer program and the Labor Inspection activities contribute to reduce child labor rate in Brazil. To reach this objective, as detailed in Section 3.3, we opted for dynamic panel models which permitted to control the endogeneity of both governmental countermeasures.

In table 5, we present the benchmark model (GMM-I) from section 3.3.2 and two variations of itself. In model GMM-II, we included lagged values of the main variables of interest, **PBF** and **insect**, to verify if the effect of both governmental countermeasures transcends to subsequent periods. In the GMM-III model, we control for time shocks by including dummies for years (**years**) so as to isolate the effect of regressors from fixed effect of time in the rates of child labor. We statistically verified the importance of such control by performing the Wald test for composite linear hypothesis. Having a test value of 44.25, we reject the null that all years coefficients are jointly equal to zero, therefore control for time fixed effects is necessary. Analogously, we tested the need to control for long-run tendency of time series (**trend**). The test value was 10.73, thus, such control is statistically important. Nevertheless, we proceed with empirical analysis by comparing

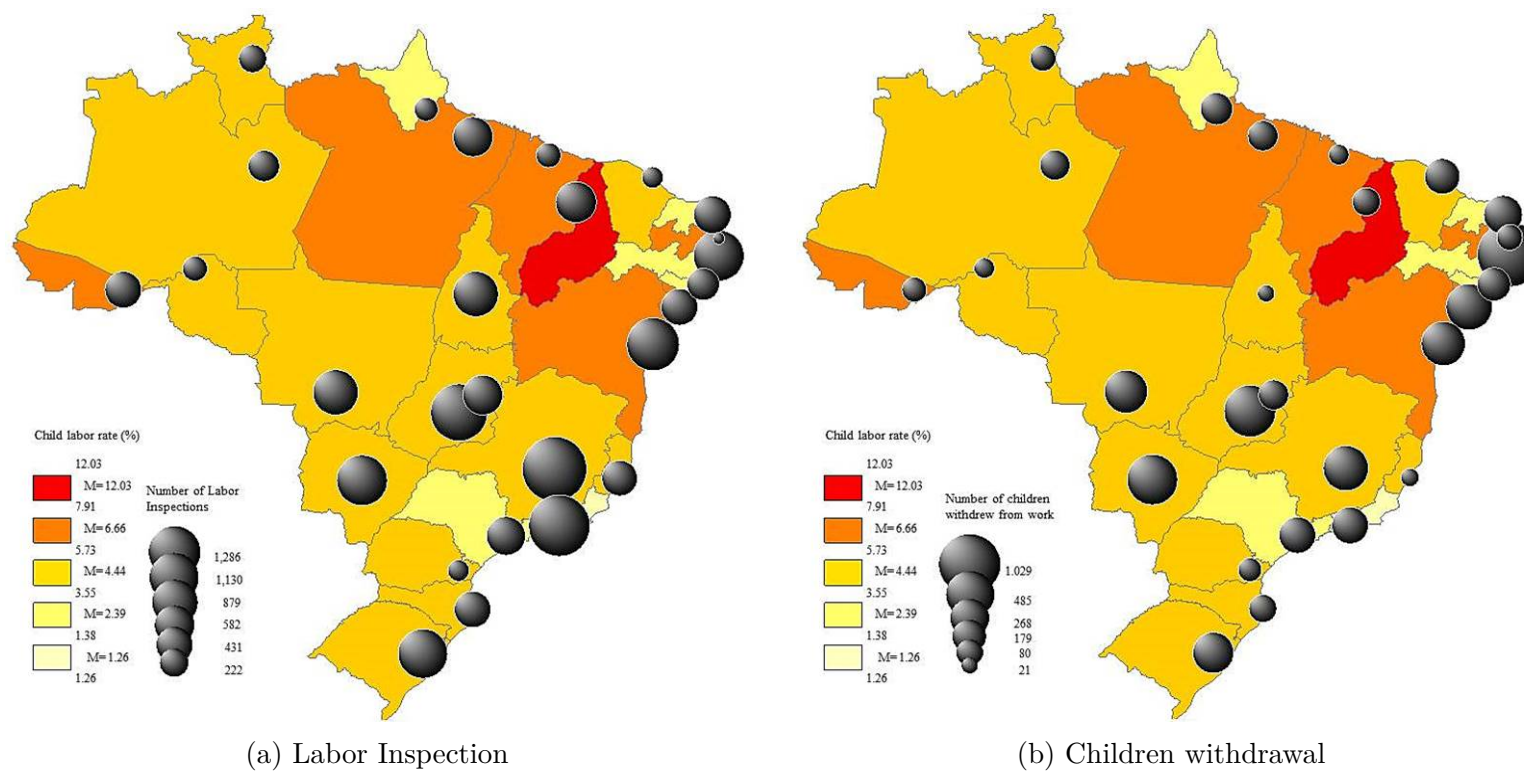


Figure 15 – Rate of child labor, number of Labor Inspections and number of children withdrew from work, 2014, Brazil.

Source: Prepared using PNAD and Information System of Child Labor (SITI) data.

Note: M denotes mean of child labor rate within respective interval.

results from this model with those from the benchmark model so as to emphasize the importance of such controls.

From the benchmark model, which has no control for time shocks and lagged values of the major variables of interest, **PBF** and **inspect**, we found empirical evidence which points that both governmental countermeasures contributed to reduce child labor. However, with these additional controls in model GMM-III, we notice that the effect found for these variables turned not to be statistically significant. Similar observation were made for the controls for **familysize** and **mothereduc**. Thus, conclusion is drawn that in light of temporal shocks and long-run tendency of time series there is no clear-cut empirical evidence concerning the effect of neither the *Bolsa Família* conditional cash transfer program nor the Labor Inspection activities.

Similar results have been found in literature concerning the effect of conditional cash transfers in Brazil. For example, Cardoso e Souza (2004) and Ferro e Kassouf (2005) found no empirical effect of the *Bolsa Escola* program in reducing child labor, but found evidence concerning its effect on school attendance. Similarly, Aquino *et al.* (2010) and Do Nascimento *et al.* (2016) found no effect of the participation in the PBF program on the probability of children to work or not. However, the latter authors found that the sum transferred to families reduced the child labor, likewise working hours. Lastly, using the same estimation method as that which we used in this essay, (RAMALHO; MESQUITA, 2013) also found no significant effect of the PBF. Nevertheless, we still argue that these authors omitted relevant controls and also did not treat the endogeneity of the PBF program.

It is important to recall that the main objective of the program is poverty and not child labor and also that the program has limitations concerning the coverage of child laborers. As noted in Fig. 7 and 8 of the descriptive analysis presented in Section 3.4, the domain of the PBF program is considerably limited concerning child labor since it only focuses on families below the poverty line. Therefore, having that majority of child laborers were above this line as at 2014, our results were not shocking.

As per Labor Inspection, we acknowledge that Almeida (2015) provided the first empirical evidence concerning the effect of inspection activities in reducing child labor. However, our results do not provide sufficient empirical evidence to support this hypothesis. Notwithstanding, we believe that the number of inspectors and inspection activities are still modest to account for the scale of child labor in Brazil.

Nevertheless, as suggested by ILO/SIT (2010), we do not limit our definition of efficiency to the outcomes and impacts of the Labor Inspection activities, but also recognize its unobservable impacts on child labor. Specifically, the Labor Inspection aims to reduce child labor through four channels: a) awareness creation, which prevents child labor in the first place; b) inspection which, directly reduces child labor; c) render of social assistance

Table 5 – Results from benchmark models

Response variable: <code>chidlabor</code>			
	GMM-I	GMM-II	GMM-III
<code>constant</code>	17.57*** (2.691)	14.65*** (3.094)	7.281 (4.435)
<code>chidlabor_{t-1}</code>	0.154** (0.071)	0.222** (0.090)	0.231** (0.094)
<code>famincome</code>	-0.448 (0.376)	-0.409 (0.378)	0.526 (0.568)
<code>childeduc</code>	-0.924 (1.353)	-1.920 (1.572)	-1.784 (2.934)
<code>familysize</code>	-1.503* (0.823)	-1.200* (0.664)	-1.224 (0.775)
<code>urban</code>	-1.563** (0.747)	-1.224* (0.654)	-1.223* (0.669)
<code>unemp</code>	-0.329** (0.140)	-0.288* (0.162)	-0.357** (0.157)
<code>mothereduc</code>	-1.548*** (0.526)	-1.378* (0.750)	-1.360 (0.836)
<code>inspect</code>	-0.0478* (0.025)	-0.0371 (0.026)	-0.0254 (0.027)
<code>inspect_{t-1}</code>		-0.0290 (0.030)	-0.000444 (0.030)
<code>PBF</code>	-0.125** (0.060)	-0.627* (0.343)	0.229 (0.398)
<code>PBF_{t-1}</code>		0.578* (0.322)	0.236 (0.359)
<code>year2007</code>			-0.0754 (0.071)
<code>year2008</code>			-0.133 (0.070)
<code>year2009</code>			-0.102 (0.112)
<code>year2011</code>			-0.188* (0.098)
<code>year2012</code>			-0.332*** (0.073)
<code>year2013</code>			-0.335*** (0.076)
<code>trend</code>			-0.149*** (0.046)
<i>N</i>	207	178	178

Note: Robust errors in parentheses; ***, ** and * denote significance at 1%, 5% and 10%, respectively; All variables, both the response variable and its regressors, are logarithmized; The constant term is the average effect of state; *N* denotes the number of observations.

to withdrawn children, which prevent them to return to work and; d) fining of exploiters, which serves as penal measure to caught firms and warning to others.

According to numerous studies (See Kassouf (2002), Hilowitz *et al.* (2004b), Inaiá (2008), Aquino *et al.* (2010), Kassouf e Justus (2010), Marin *et al.* (2012) and ILO (2013), among many others), the level of urbanization plays a very important role in the determination of the rate of child labor. Specifically, evidence shows that most child laborers are found in the rural area, especially in the agricultural sector. The incidence of child labor is higher in rural areas mainly because of fewer inspections, high incidence of family agriculture and higher level of poverty compared to urban areas. The importance of this variable is reflected in the magnitude of its estimate. The coefficient indicates that the rate of child labor reduces in, approximately, 1.2% for every increase of 1% urbanization rate.

According to Inaiá (2008) and Marin *et al.* (2012), child labor in the rural area tends to be more hazardous because they involve the most invisible forms of child labor and are less passive of reduction through inspection, especially in family agriculture and domestic services. Marin *et al.* (2012) also affirmed that child labor is higher in many Brazilian rural regions because it is not considered as exploit, but as assistance, means of socialization and heir training. Note that, in such cases, child labor is not necessarily caused by poverty, but by a category of social norm which is referred to as *filial interactions* by López-Calva *et al.* (2002). Repórter Brasil (2013) concurs with Inaiá (2008) and Marin *et al.* (2012) regarding this, but added that child labor in the urban area is more visible, however the most difficult to eliminate.

Basu e Van (1998) and Galli (2001) theoretically demonstrated that child labor is positively related to adult unemployment in the sense that it reduces the level of family income and, thus, may lead such household to send children to work. However, such relationship depends on the labor market structure and the degree of substitution between adult and child labor. In the case of an oligopsonic adult labor market, such relationship is observed, but Basu e Van (1998) informed that the relationship between adult wage and child labor may be ambiguous in a competitive labor market. Similarly, Galli (2001) pointed out that if child labor and unskilled adult labor are substitutes, a exogenous increase in child labor supply can lead to the increase in adult unemployment. The estimate found for **unemp** indicates a negative relationship between the rate of child labor and adult unemployment, thus, not corroborating the theoretical relationship pointed by Galli (2001). However, the coefficient observed goes in line with the evidence in Duryea *et al.* (2007) for children between the age 10 and 14. A possible cause for this is that the **unemp** variable captured the effect of economic progress. In this way, one can interpret that the reduction of economic progress led to both adult and child unemployment. Nevertheless, we suggest further investigation of the effect of the effect of adult unemployment on child

labor.

Finally, our results corroborate that found by Ramalho e Mesquita (2013) regarding the existence of temporal dependence of the rate of child labor, γ . Specifically, we observed a positive value of about 0.23. Similarly, these authors observed a positive sign and a value of about 0.29. In other words, despite the divergence of our model specification from that of these authors, we both conclude that the rate of child labor is dependent on itself over time. In light of the possibility of spill-over effect of child labor from one period to the other, in the next essay we address the persistence of such dependence over generations of the same family.

4 Intergenerational Persistence of Child Labor

Early theoretical studies pointed to the probability of child labor to perpetuate itself among generations of the same family through forgone education. Recent empirical studies do not reject this hypothesis, thus, affirming that children from parents who were child laborers are more likely to start working at early age. Despite significantly contributing to literature, no empirical evidence was provided concerning the *tipping point* at which the vicious cycle of child labor may turn virtual. In this essay, we test the hypothesis that such cycle may be reverted if the minimum age for work is increased. To pursue this objective, we used a pooled sample from 2004 to 2014 PNAD data to estimate probit models. Aside reaffirming the existence of intergenerational persistence of child labor, we found that the *tipping point* of the child labor cycle is observed if the minimum age for work is increased.

One of the conclusions made in the previous essay of this dissertation is that of the existence of inertia or temporal dependence of child labor rate in Brazil. In light of such evidence, this essay discusses a socioeconomic consequence of the maintenance of such dependence in the long run, that is, test for intergenerational persistence of child labor.

There is consensus in literature that poverty can perpetuate itself over family generations, especially, thorough education, igniting a poverty cycle. Having that poverty is a potential motivator of the supply of child labor, it likely that the cycles of both are also correlated. In other words, parents who forwent education due to work during childhood are bound to earn lower income when adult (JUSTUS *et al.*, 2015) and, thus, remain poor. Moreover, poverty situation may drive such parents to send their children to work in order to support family income to reach subsistence level (BASU; VAN, 1998). As a result, such children may reinstate the same cycle faced by their parent, igniting the child labor and poverty cycle. However, it is important to note that such relationship is most likely to hold, on the one hand, if work and education are mutually exclusive choices – which is not always true (KASSOUF, 2015). On the other hand, if work reduces the quality of acquired human capital compared to that required in the labor market.

The existence of intergenerational persistence of child labor and poverty was suspected and emphasized by Alfred Marshall in the XIX century. Thereafter, Basu (1999)



Figure 16 – Percentage of trapped and untrapped children in the vicious cycle of child labor

Source: Prepared using 2004-2009 and 2011-2011 PNAD data.

proposed a theoretical model which indicated how poverty cycle can trigger a vicious cycle of child labor through forgone education. This author connoted such relationship as the *child labor trap* and referred to the point at which such vicious cycle becomes virtuous as the *tipping point*. Subsequently, Emerson e Souza (2003) extended this model and, using cross-sectional analysis of Brazilian data, provided empirical evidence that parents who were child laborers are more likely to send their children to work compared to parents who were not child laborers. In line with these authors, Aquino *et al.* (2010) empirically pursued similar objective, although exploiting differences of such trap between urban and rural areas of Brazil.

Comparing the findings of both empirical studies, one is led to infer that there is, indeed, the risk of *child labor trap* in Brazil. Unlike these previous studies which presented a static analysis, here in Fig. 16, we illustrate how this trap evolved over time. Moreover, this figure presents not only the trapped children – those who work and have parents who were child laborers – unlike previous studies, but also spotlights untrapped children – those who work but whose parents were not child laborers.

Firstly, we focus on the trapped children. Fortunately enough, the incidence of intergenerational perpetuated child labor reduced expressively during the period between 2004 and 2014. This indicates that parents who were child laborers are being able to break the vicious cycle of child labor due to the general reduction of poverty, increased access to education, easier access to credit facilities and greater awareness of the negative impact of child labor. Aside the continuous and systematic reduction of the proportion of trapped children, especially between year 2005 and 2013, abrupt increase was observed from year 2004 to 2005 and from year 2013 to 2014. Therefore, we consider that it is important to

control for time shocks.

Surprisingly, the untrapped children, who should not be working in the first place according to conventional theories, seemed not to be highly affected by these socioeconomic betterment. Recalling Basu (1999) and Emerson e Souza (2003), forgone education for the sake of work during childhood as a result of poverty is what feeds the vicious cycle. If this argument holds, parents who were not child laborers should be better off during adulthood and should send not children to work.

Unlike in trapped children, the evolution of the proportion of those untrapped seems to be less responsive to reductions over time. This proportion was clearly stagnant during the period of 2004 and 2007, and only slight fluctuations¹ were observed in subsequent years. Notwithstanding, reduction was observed in 2011 compared to previous years. However, as from the year 2011, these proportion becomes relatively stagnant once again. It is also worthwhile to note that not even the abrupt increase observed in 2014 was able to cause expressively increase in the proportion of untrapped children. These observations call for attention on these specific child laborers. However, our focus here is on trapped children.

Despite the contributions of Emerson e Souza (2003) and Aquino *et al.* (2010), we observe that no information was provided concerning the possibility of reverting the vicious cycle of child labor. Therefore, in this essay, we seek to enrich this topic in the following ways: a) analyze the existence of intergenerational persistence of child labor controlling time shocks between year 2004 and 2004; b) indicate the intensity of the vicious cycle according to the age group at which parents entered the labor market; and c) point the minimum age for work, which reverts the vicious cycle, thus, contributing to the debate concerning the best minimum age for employment in Brazil.

In a recent studies, Kassouf (2015) showed that the proportion of children and adolescents who conciliate work and study increased in Brazil over time. Therefore, we assume that work and study are not mutually exclusive choices and that child labor affects the quality of human capital acquired, mainly, due to shortage of time for rest, play, study and assimilation of academic knowledge. The hypothesis alleged to north this study is that the vicious cycle may be reverted if the minimum age for employment is increased to, at least, a level at which the human capital acquired through education is sufficient to secure a better paid work to meet family's financial needs.

This essay is divided in four sections. In Section 4.1 and 4.2 we provide the theoretical and empirical studies, respectively, that support the alleged hypothesis and give insights concerning results to be expected during empirical exercises. Section 4.3 presents the empirical strategy used and empirical results are provided in Section 4.4.

¹ Remember that PNAD was not carried out in 2010.

4.1 Theoretical Background

In terms of dynamics concerning child labor, few are those who consider its long-run consequences. One of the first remarkable and documented perception concerning the existence of intergenerational persistence of child labor is that of Alfred Marshall in 1895. In the authors words:

“But the point on which we have specially to insist now is that this evil is cumulative. The worse fed are the children of one generation, the less will they earn when they grow up, and the less will be their power of providing adequately for the material wants of their children; and so on to following generations. And again, the less fully their own faculties are developed, the less will they realize the importance of developing the best faculties of their children, and the less will be their power of doing so. And conversely any change that awards to the workers of one generation better earnings, together with better opportunities of developing their best qualities, will increase the material and moral advantages which they have the power to offer to their children.” (MARSHALL, 1895)

It is clear that Marshall (1895) was more concerned about the cycle of poverty driven by the faculty or human capital of children from a certain generation. However, one can easily deduce that given the high demand and deregulation of child labor in the XIX century during the industrial revolution, the cycle of poverty was followed by the cycle of child labor. Aside pointing to the existence of this vicious cycle, Marshall (1895) also suggested its reversion through better labor market conditions, which permits parents to propitiate better living conditions and education to children. Admitting that work during childhood jeopardizes human capital accumulation of children which, in the future, tends to limit their future productivity and in turn perpetuate poverty, Basu (1999) developed the theoretical model of *child labor trap*.

The author considers an overlapping generation model with two periods. In the first period the individual is a child and lives with his parents and in the second period, the same individual is parent and has a child. In this model, work and study (*proxy* for source of human capital) were considered mutually exclusive choices. In a day, a child is considered to spend fraction e of his time at work and $1 - e \equiv h$ in school. Supposing that the level of adult human capital depends on the amount of time spent in school during childhood, the total labor unit of an adult, L_t , is given by

$$L_t = L(h_{t-1}), \quad L' > 0, \quad L'' < 0 \quad (4.1)$$

Thus the wage of one unit of adult labor in a labor market with perfectly inelastic demand is given by

$$\bar{V}L(1 - e_{t-1}) \equiv W_t \quad (4.2)$$

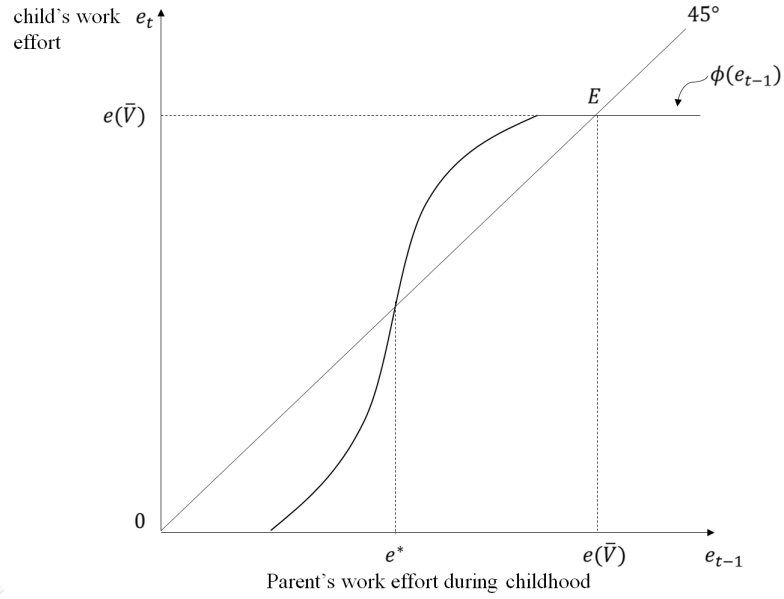


Figure 17 – Child labor trap.

Source: Basu (1999)

It was also assumed that there is a certain level of wage, \underline{W} , below which parent send a child to full time work ($e = 1$) and a level of income, \bar{W} , above which children are sent to school ($e = 0$). Assuming the *substitution axiom*, one can write e as a function of parent's wage, thusly

$$e_t \equiv e_t = e(W_t) \equiv e(\bar{V}L(1 - e_{t-1})) \equiv e_t = \Phi(e_{t-1}) \quad (4.3)$$

where Φ is upward sloping and bounded at $e(\bar{V}L(0)) = e(\bar{V})$. For convenience, the author considered that Φ intersects a 45° line illustrated in Fig. 17. Similarly to the model presented by Basu e Van (1998), this dynamic model points out two stable equilibria (point 0 and E) and one unstable equilibrium. At point E parent send its child to work full-time. Such child acquires no human capital (through education) and continues poor when adult and, therefore, has to send its child to work. In other words, the equilibrium point E depicts the *child labor trap*. On the other way round, the child is sent to school on the equilibrium point 0. In this case, such child turns adult, earn adequately and, thus, faces a virtuous cycle.

In the case of *child labor trap*, Basu (1999) suggested government intervention in order to reverse the cycle of either poverty or child labor. The author also claimed that if there is large effort to educate a certain generation, the economy will reach a “tipping point” at which the vicious cycle turns virtuous. However, the sum of investment required for this effort may turn such intervention unrealistic, especially in developing countries. In this sense, the author points that the availability of credit to poor families or study loan may incentive poor parents to enroll children in school and not send to work. Regarding the effect of credit availability to poor families, Ranjan (2001) and Das e Deb (2006), based on theoretical frameworks concur that the incidence of child labor can be reduced

by credit-related policies. However, Das e Deb (2006) emphasizes that such policies only have effect in the long run.

Emerson e Souza (2003) contributed to the theoretical model presented by Basu (1999) providing a similar theoretical model and an example of how intergenerational persistence of child labor may emerge using the Cobb-Douglas utility function. Upholding the assumptions made in Basu (1999) regarding parent's altruism, family composition, luxury and substitution axiom, credit constrains and human capital accumulation, Emerson e Souza (2003) was able to illustrate how the trap may be generated. Additional assumption was made that families with little education need children's contribution through work compared to richer families. With this, parents have to make the decision to send children to work or not in each period. The utility function of such family is given as

$$U_t = U(c_t, h_{t+1}) \quad (4.4)$$

where c_t and h_{t+1} denote family total consumption and child's acquired human capital, respectively. Here, it is clear that the family cares about the future human capital of the child, which is accumulated in the present through education. Having the human capital assumption, parent's and child's income is given as $w_t^a = h_t$ and $w_t^c = 1 - e_t$, respectively, where e_t is the amount of time that a child spends in school. Thus, family income is given by $W_t = w_t^a + w_t^c$, which is subjected to meet the budget constraint of $c_t \leq W_t$.

Supposing that all individuals have the innate level of human capital of 1 which becomes greater due to education, children and uneducated adults have 1 unit of human capital and, therefore, earn the same in the labor market. This can be formally represented by

$$h_{t+1} = f(e_t) \quad \text{where } f(0) = 1, f(1) = \bar{h} > 1, \text{ and } f'(e_t) \geq 0 \forall e_t \in [0, 1] \quad (4.5)$$

In this model, the challenge adults face is to

$$\max_{e_t} U(h_t + 1 - e_t, f(e_t)) \quad (4.6)$$

The solution to such problem is e_t^* , which is a function of h_t and the law-of-motion is $h_{t+1} = f(g(h_t)) \equiv \Phi(h_t)$. Although the $\Phi(\cdot)$ may assume any form, the case study here is that in which $f(\cdot)$ and $g(\cdot)$ are positively related. In this case, a *child labor trap* may occur giving rise to two stable equilibria (at point $h_t = 1$ and point $h_t = \bar{h}$) and one which is unstable (at point $h_t = h^*$). Specifically, point $h_t = h^*$ is critical in the sense that it marks the threshold which separates the case in which the child does nothing but work ($h_t = 1$) from that in which child only study ($h_t = \bar{h}$). This is better illustrated in Fig. 18.

To this point, it is noticeable that both Basu (1999) and Emerson e Souza (2003) emphasized that child labor may be transmitted across generations, through the level

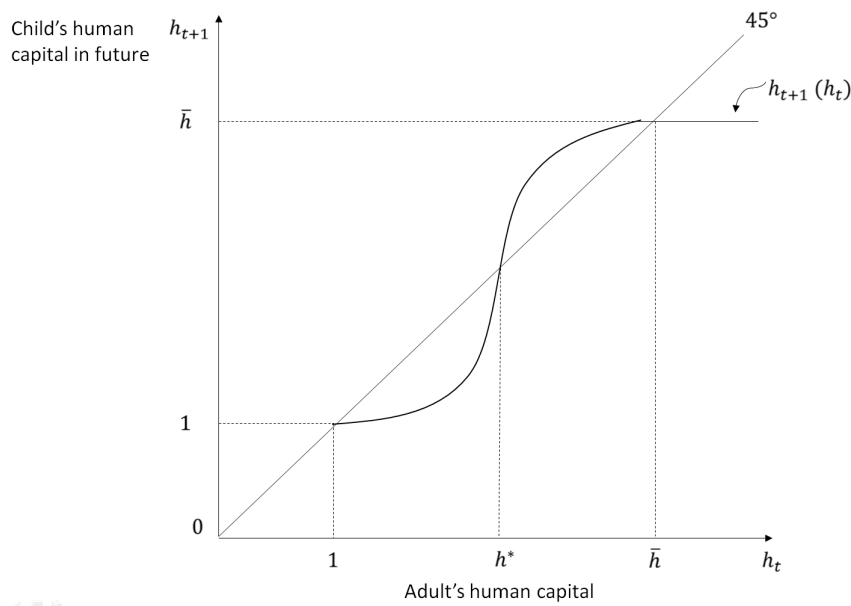


Figure 18 – Intergenerational persistence of child labor
Source: Emerson e Souza (2003)

of human capital acquired by parents. Therefore, theoretical studies indicate a positive relationship between past child labor and present child labor. Note that none of these studies explicitly pointed the effect of the specific age at which parents entered the labor market. However, logical deduction leads to expect that the earlier parents started working the lesser human capital they were able to acquire through formal education and, thus the higher the likelihood of their children to work.

4.2 Previous Studies

Numerous studies concur that child labor interferes with the education of children in the sense that it compels them to evade school prematurely or conciliate work and schooling, thus, reducing children's accumulation of human capital. However, it is important to note that aside through forgone education, *child labor trap* may be sustained through cultural and social norms such as filial obligations (LÓPEZ-CALVA *et al.*, 2002; EMERSON; SOUZA, 2003).

Concerning empirical evidence of the intergenerational persistence of child labor, only two studies were found for Brazil, which are those of Emerson e Souza (2003) and Aquino *et al.* (2010). Aside the theoretical framework presented in Section 3.1, Emerson e Souza (2003) provided empirical evidence which confirms the hypotheses that parents who were child laborers during childhood are more likely to send their children to work at early age. In specific, the authors used 1996 Brazilian Household Surveys data (henceforth, PNAD) to estimate probit and Cox proportional hazard models. Having that the PNAD data provides information regarding the occupational status of children and the age at

which parents started work, one can easily verify the intergenerational persistence of child labor among generations of the same family. It is important to add that the major reason why these authors adopted the 1996 PNAD data was because it provides not only information concerning parents, but also that of grandparents in respect of level of education and income. Thus, these authors were able to decently model the persistence of child labor across three generations, which is undoubtedly one of the major strength of their study.

In the probit model, the response variable, which assumes 1 if child works and 0 otherwise, was adjusted against regressors such as dummy variables for parents who were child laborers, parent's education, number of brothers, child's gender and level of urbanization of family's residence. These authors further controlled for grandparent's level of education in order to enhance the *proxy* for family income. However, no statistical significance was found for direct relationship between grandparent's level of education and the probability of grandchild to work. This result indicated that, despite being a brilliant move, the control for grandparent's income or level of education is irrelevant. Consequently, there is no need to restrict studies to the 1996 PNAD data for the sake of controlling grandparent's variables.

Notwithstanding, statistically robust evidence was found for the positive relationship between early work of parents and the probability of children to work. Specifically results from all empirical exercises pointed that early labor of mothers has greater impact on the decision of children to work or not compared to that of fathers. These authors also confirmed that parent's education is one, but not the only, important factor which drives the *child labor trap*. The reason for this is that despite isolating the effect of family income and parent's level of education, the child labor cycle persisted. Therefore, conclusion was drawn that the effect of parental child labor may be more complex than the supposed human capital relationship. With this, Emerson e Souza (2003) pointed out the likelihood of such persistence to be attributed to cultural or social norms, buttressing the crucial points made by Marin *et al.* (2012), CONAETI (2011) and emphasized in Chapter 2 concerning the cultural roots of child labor in Brazil.

Aquino *et al.* (2010) contributed to the study of Emerson e Souza (2003) by also empirically investigating the existence of *child labor trap* in Brazil adopting probit models and using data from 1992 and 2004 PNAD. As upgrade, these authors performed separate analysis for rural and urban areas in order to verify if the intergenerational persistence of child labor can be attributed to peculiarities of the Brazilian rural and urban areas. Aside reaffirming the existence of the trap, evidence was found that the effect of parental child labor is greater in the rural areas compared to urban areas and that the magnitude of the effect reduced substantially between 1992 and 2004.

In contribution to both empirical studies reviewed in this section, this essay pro-

vides information concerning how the specific age at which parents started work affects the intensity of this trap. Most importantly, we provide the first empirical evidence concerning the *tipping point* at which the vicious cycle of child labor turns virtuous.

4.3 Methodology

4.3.1 Data and Sample

The database used here was obtained from the PNAD conducted by the IBGE, covering the period of 2004–2009 and 2011–2014. Acknowledging from Emerson e Souza (2003) that it is unnecessary to control for grandparents' variables, we opt not to limit analysis to 1996 PNAD data and, thus, used a larger sample. Aside providing current figures of the child labor cycle, this choice permitted to control time variations of the child labor cycle and to expressively increase sample size.

We opted to filter the overall data to best fit the objectives of this essay. The first filter was to restrict the sample to individuals between age 5 and 15, retaining about 19% of the overall sample (see Sample I in Fig. 19). As the major interest of this essay is the intergenerational persistence of child labor, we further restricted the database to children and adolescents between age 5 and 15 who live with their mothers. The reason for this is that the PNAD only register as family members those individuals who live in the same household and consider one another as family. The loss in Sample II due to this filter was modest (about 12% of Sample I) since we focus on young individuals who, in most cases, are still dependent on parents.

Furthermore, the PNAD question concerning the age at which individuals started working is only directed to those who were employed during the reference week of surveys. This engendered additional unavoidable and crucial filter which caused loss of about 32% from Sample II. Thus, the empirical analysis of this essay is limited to child laborers who live in the same household with their mothers who were employed during the reference week of the PNAD surveys.

We acknowledge that such filters may cause severe implication to analysis, especially since children with unemployed parents tend to be more vulnerable. For this, we compare statistics of the overall and final samples in Table 6. Note that despite the expressive reduction of sample size, the mean and standard deviation of variables from the overall and final samples converge.

The average rate of child labor in Brazil during the period in view was about 7%. During this same period, it was observed that about 51% of the mothers contained in the sample were child laborers. Specifically, about 12% of these mothers entered the labor market at or before the age of 9 and, approximately, 40% of them started work between

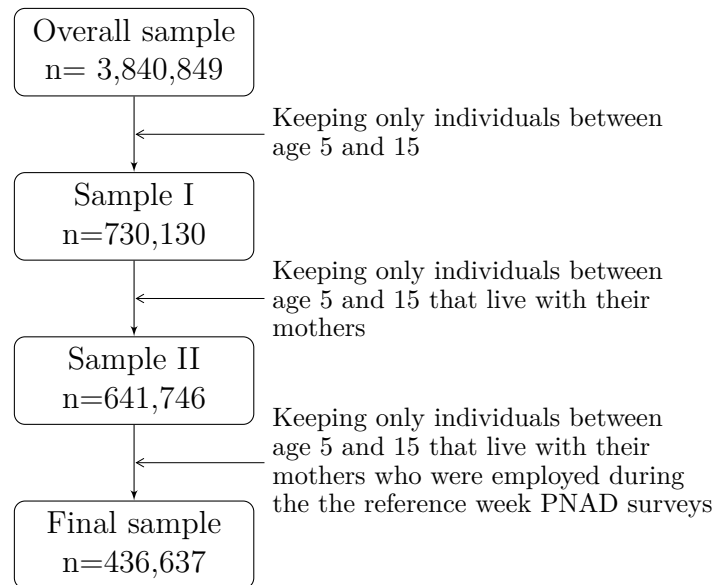


Figure 19 – Filtration of pooled sample of PNAD data (2004 to 2009 and 2011 to 2014)

Source: Prepared by author.

Note: n denotes the number of observations.

the age of 10 and 14. Specifically, the average age at which mothers start working is 14.

Furthermore, all estimates were computed using the weights or sample expansion factors provided by the IBGE in the data files.

Table 6 – Summary statistics

	Variable	Description	Filtered sample		Overall sample	
			Mean	Std. Dev	Mean	Std. Dev
Individual's variables	childlabor	1 for child laborer and 0 non child laborer	0.0703	0.2557	0.0415	0.1994
	famincome	Average family per capita income (in reais – R\$)	711.01	1183.82	617.19	1076.32
	male	1 for male and 0 for female	0.5064	0.5000	0.5106	0.4999
	age	Individual's age in years	10.16	3.13	10.13	3.14
	childeduc	1 if enrolled in school and 0 if not	0.9610	0.1937	0.7603	0.4269
	urban	1 for residence in urban area and 0 for rural	0.8036	0.3972	0.8161	0.3874
	asians	1 if skin color is yellow and 0 if not	0.0029	0.0539	0.0028	0.0527
	mulatto	1 if skin color is brown and 0 if not	0.5004	0.5143	0.4998	0.4996
	black	1 if skin color is black and 0 if not	0.0032	0.0561	0.0572	0.2323
	white	1 if skin color is white and 0 if not	0.4187	0.4933	0.4154	0.4928
	familysize	Family size	4.51	1.57	4.45	1.59
Mother's variable	CLmom	1 if mother was child labor and 0 if not	0.5140	0.4998		
	CLmomage	Age at which mother started working	14.72	5.11		
	CLmomage2	Square of age at which mother started working	242.82	225.57		
	CLmom0-9	1 if mother started working at or before age 9 and 0 if otherwise	0.1174	0.3220		
	CLmom10-14	1 if mother started working between age 10 to 14 and 0 if otherwise	0.3965	0.4892		
	CLmom15-17	1 if mother started working between age 15 to 17 and 0 if otherwise	0.2387	0.4263		
	CLmom18-19	1 if mother started working between age 18 to 19 and 0 if otherwise	0.1211	0.3263		
	CLmom20-24	1 if mother started working between age 20 to 24 and 0 if otherwise	0.0831	0.2761		
	CLmom25-29	1 if mother started working between age 25 to 29 and 0 if otherwise	0.0257	0.1583		
	CLmom30-above	1 if mother started working at or after age 30 and 0 if otherwise	0.0172	0.1299		
	mothereduc	Mother's level of education (in years of studies)	7.56	4.39		
	agemom	Mother's age	36.03	7.15		

Note: Number of observation for filtered sample is 436,637 and for overall sample is 730,130.

4.3.2 Empirical Model

In this essay, our response variable is a dummy, which is 1 if the child or adolescent is a child laborer and 0 if otherwise. Therefore, the conventional OLS model is inadequate because such variables are Bernoulli distributed. Thus, probit models are resorted. Details regarding the construct and properties of probit models presented in this section are based on Cameron e Trivedi (2010).

In the probit model, the probability mass function of the observed outcome of \mathbf{y}_i is $p^{\mathbf{y}}(1 - p)^{1-\mathbf{y}}$ with mean p and $\text{var}(\mathbf{y}) = p(1 - p)$. The regression model is formed by parameterizing p to depend of an index function $\mathbf{x}'\beta$, where \mathbf{x} is a $k \times 1$ regressor vector and β is a vector of unknown parameters which produces the probability function

$$p_i \equiv \Pr(\mathbf{y}_i = 1|\mathbf{x}) = F(\mathbf{x}'_i\beta) = \int_{-\infty}^{\mathbf{x}'_i\beta} \phi(\mathbf{z})d\mathbf{z} \quad (4.7)$$

where $F(\mathbf{x}'_i\beta)$ is a cumulative distribution function for $p \in [0, 1]$ and \mathbf{z} is a column of $K \times 1$ latent variable.

Generally, the estimates provided by the probit model is given a latent-variable interpretation so as to provide a link with a liner regression model. This is done by assuming a single-index model which relates the observed binary outcome, \mathbf{y} , with the latent variable, \mathbf{y}^* . Such model is composed of regressors, \mathbf{x}_i , and an error term, u , and is represented as

$$\mathbf{y}^* = \mathbf{x}'_i\beta + u \quad \text{and} \quad \mathbf{y} = \begin{cases} 1 & \text{if } \mathbf{y}^* > 0 \\ 0 & \text{if } \mathbf{y}^* \leq 0 \end{cases} \quad (4.8)$$

Simple manipulation of the latent model in Eq. 4.8 will show that $\Pr(\mathbf{y}_i = 1) = \Pr(\mathbf{x}'_i\beta + u > 0) = F(\mathbf{x}'_i\beta)$. It is, however, important to note that the error term of the latent model necessarily has to be normally distributed for the probit model to be most appropriate.

The estimation process of the probit model is done by the maximum likelihood estimator (MLE) alike other binary outcome models with Bernoulli distribution. For a sample of N independent observations, the MLE maximizes the associated log-likelihood function

$$Q(\beta) = \sum_{i=1}^N [\mathbf{y}_i \ln F(\mathbf{x}'_i\beta) + (1 - \mathbf{y}_i) \ln \{1 - F(\mathbf{x}'_i\beta)\}] \quad (4.9)$$

which is obtained by iterative methods and is asymptotically normally distributed. Although estimates observed form the probit model are consistent, interpretations may be quite challenging due to the latent variable. For this reason, interpretation of observed estimates will be based, exclusively, on marginal effects calculated thusly

$$\frac{\partial p}{\partial \mathbf{x}} = \phi(\mathbf{x}'\beta)\beta_j \quad (4.10)$$

To verify if model is misspecified, two major tests are executed: wald test, which null hypothesis test for the combined statistical significance of parameters, and Likelihood

Ratio test (LR), is used to compare models. Specifically, the LR test is used to compare two nested models, i.e., when the specification of a simpler model (s) is special case of a general model (g). This test is formally represented as the ratio between the likelihood functions ($\mathcal{L}(\theta)$) of both models: $LRT = -2\log_e\left(\frac{\mathcal{L}_s(\hat{\theta})}{\mathcal{L}_g(\hat{\theta})}\right)$. Therefore, the LR test can also be calculated using the difference in the log-likelihoods. Using this calculation one can simply compare nested models based on the magnitude of the log-likelihoods, giving preference for higher values (GREENE, 2003). For further comparison of models, we use the Pseudo- R^2 also known as the McFadden's test. Similarly to the R^2 of conventional OLS models, the upper and lower limit of Pseudo R^2 are 1 and 0, respectively. Thus high values of the Pseudo R^2 are desirable.

As per model specification, the response variable is a dummy which is 1 if individuals below the age of 16 works and 0 otherwise (**childlabor**). The regressors considered are: dummy variable which is 1 if the individual's mother was a child laborer and 0 otherwise (**CLmom**); seven dummy variables which control for the age bracket at which the individual's mother started work (**CLmombelow9**, **CLmom10-14**, **CLmom15-17**, **CLmom18-19**, **CLmom20-24**, **CLmom20-24** and **CLmomabove30**), whereas individuals below age 17 are used as base group; age at which the individual's mother started working (**CLmomage**) and its square; mother's age (**agemom**); mother's level of education measured in years of schooling (**mothereduc**); logarithm of average per capita family income, $\log(\text{famincome})$; family size (**familysize**); a dummy variable which is 1 if the individual is male and 0 otherwise (**male**); individual's age (**age**); dummy variable which is 1 if the individual is enrolled in school and 0 otherwise (**childeduc**); dummy variable if the individual resides in an urban area and 0 otherwise (**urban**); five dummy variable for skin color or race²(**white** as base group, **asians**, **black** and **mulatto**)³; group dummy variable for each year to control for time shocks in child labor (**dummy for years**), and; control for long-run tendency of a time series effect of child labor (**linear trend**).

Regarding the main variable of interest, **CLmom**, it is important to highlight that as the PNAD data does not provide information concerning fathers, those of mothers will be used as *proxy* to control for parental background. Evidences from Emerson e Souza (2003) pointed that mother's level of education has relatively higher impact on child labor decisions. Thus, we assume that conclusions drawn from mother's variables can serve as *proxy* for both parents.

² The Brazilian Institute of Geography and Statistics (IBGE) classifies race/skin color according to physical appearance which is self-declared by individuals. These categories are: white, black, yellow (Asian-Brazilians), brown (Mulatto) and indigenous.

³ Indigenous population was excluded due to the small number of observations.

4.4 Results

The hypothesis which we analyze in contribution to previous studies is that the child labor cycle is reversible through the minimum age for work. The empirical strategy used to reach this objective is the probit model estimated by maximum likelihood.

Table 7 presents the result from models I to V, which specifications were presented in previous section. However, our analysis will be centered on the marginal effects presented in Table 8, which were calculated for discrete changes in dummy variables and at means for continuous variables. The modeling exercise adopted here is a cumulative incremental procedure of group regressors. Loosely speaking, category of regressors were gradually incremented in the model in order to verify the stability of other estimates.

As the modeling exercise transit from model I to III, which is the complete benchmark model with all regressors, we observe that the signs and statistical significance remained unaltered. Note that the (**dummy for years**) was included in all models to account for time shocks. However, the importance of such control was tested by carrying out the Wald tests of simple and composite linear hypotheses on the benchmark model. With a Wald test value of $\chi^2 = 681.96$ the null hypothesis that all dummies for years are equal to 0 is rejected at a level of 1%. Thus, the control of dummy variables for time is important. In model IV, we substituted **CLmom** for a group of dummy variables to control for the age bracket in which the individuals mother started working (**CLmombelow9**, **CLmom10-14**,..., **CLmomabove30**). Such control enables to verify the depth of the *child labor trap* given the age at which the individuals' mothers started working. Lastly, in model V, these age brackets were substituted for the specific age at which mother's started working and its square (**CLmomage** and **CLmomage squared**, respectively). The reason for this is to observe if there is a quadratic relationship between this variable and the probability of children to work. If such relationship exists, the next step is to find the specific age at which this probability is minimum.

Given the similarity between the benchmark model and the panel data models presented in Chapter 3, it is of expectation that the signs for the **log(famincome)**, **childdeduc** and **urban** from both models to converge. This was exactly the case. Therefore, poverty is affirmed to be negatively related to child labor; the enrollment of children and adolescents in schools reduces their likelihood to work and; the incidence of child labor is lesser in the urban areas.

Regarding other control variables, it was found that boys are more likely to be child laborers compared to girls. The debate herein is that the number of female child laborer is prone to be underestimated because great number of girls work as housekeepers, babysitters or domestic workers (GUARCELLO *et al.*, 2007; Repórter Brasil, 2013). However, numerous studies have shown that the incidence of child labor is more frequent among

boys (KASSOUF, 2001; EMERSON; SOUZA, 2003; ILO, 2007; INAIÁ, 2008; Repórter Brasil, 2013; ILO, 2013, to mention few). The set of dummy variable for skin color indicates that the incidence of child labor is higher among the mulatto and black population compared to the white population.

Table 7 – Results of estimation (coefficients)

Response variable: <code>chidlabor</code>						
Category of regressors		I	II	III	IV	V
Individual's variables	<code>male</code>	0.399*** (0.006)	0.400*** (0.006)	0.413*** (0.007)	0.404*** (0.008)	0.404*** (0.008)
	<code>childeduc</code>	-0.389*** (0.012)	-0.388*** (0.012)	-0.337*** (0.015)	-0.306*** (0.017)	-0.309*** (0.017)
	<code>age</code>	0.211*** (0.001)	0.214*** (0.001)	0.215*** (0.002)	0.213*** (0.002)	0.214*** (0.002)
	<code>urbano</code>	-0.879*** (0.006)	-0.812*** (0.007)	-0.681*** (0.008)	-0.727*** (0.009)	-0.713*** (0.009)
	<code>asians</code>	-0.161** (0.064)	-0.122* (0.065)	-0.0350 (0.070)	-0.0106 (0.077)	-0.00747 (0.077)
	<code>brown</code>	0.104*** (0.006)	0.0591*** (0.007)	0.0258*** (0.007)	0.0135* (0.008)	0.0118 (0.008)
	<code>black</code>	0.0784*** (0.013)	0.0343** (0.013)	-0.00825 (0.015)	-0.0170 (0.017)	-0.0119 (0.017)
	<code>logfamincome</code>		-0.0569*** (0.004)	-0.00735* (0.004)	-0.0230*** (0.005)	-0.0183*** (0.005)
Family's variables	<code>familysize</code>		0.0344*** (0.002)	0.0369*** (0.002)	0.0384*** (0.002)	0.0384*** (0.002)
Mother's variables	<code>agemom</code>			-0.000310 (0.000)	-0.000698 (0.001)	-0.00145** (0.001)
	<code>mothereduc</code>			-0.0256*** (0.001)	-0.0273*** (0.001)	-0.0262*** (0.001)
	<code>CLmom</code>			0.512*** (0.007)		
	<code>CLmombelow9</code>				0.558*** (0.014)	
	<code>CLmom10-14</code>				0.331*** (0.012)	
	<code>CLmom15-17</code>				0.114*** (0.014)	
	<code>CLmomage</code>					-0.100*** (0.003)
	<code>CLmomage squared</code>					0.00186*** (0.000)
Time variables	<code>dummy for years</code>	yes	yes	yes	yes	yes
	<code>linear trend</code>	yes	yes	yes	yes	yes
N		747868	716714	630471	432669	432586
Pseudo R^2		0.237	0.240	0.273	0.270	0.272
Log likelihood		-61023209.8	-58615484.1	-48361255.8	-39301877.2	-39197508.2
LR χ^2 (degree of freedom)		45529.4 (16)	44103.9 (18)	40198.8 (21)	33339.0 (23)	33585.0 (22)

Note: Standard errors in parentheses; ***, ** and * denote significance at 1%, 5% and 10%, respectively, and; N denotes number of observations.

The coefficient of the major variable of interest, `CLmom`, indicates that children and adolescents, whose mothers were child laborers, are most likely to be child laborers compared to other children. This observation affirms the theoretical postulate of Basu (1999) and supports the evidence found in Emerson e Souza (2003) and Aquino *et al.* (2010) regarding the existence of intergenerational persistence of child labor. According to these authors, the trap is manifested through forgone education or low accumulation of human capital during childhood which, in turn, reduces future productivity and earnings.

Individuals in such situation tend to remain poor and are induced to send their children to work at early age. However, in light of the observations from Chapter 2, this study admits that the *child labor trap* may also emerge as a result of unobservable factors such as social and cultural norms (LÓPEZ-CALVA *et al.*, 2002; MARIN *et al.*, 2012).

Table 8 – Marginal effects for discrete changes in dummy variables and at means for continuous variables

Response variable: childlabor						
Category of regressors		I	II	III	IV	V
Individual's variables	male	0.0359*** (0.001)	0.0361*** (0.001)	0.0350*** (0.001)	0.0406*** (0.001)	0.0405*** (0.001)
	childeduc	-0.0350*** (0.001)	-0.0351*** (0.001)	-0.0285*** (0.001)	-0.0308*** (0.002)	-0.0309*** (0.002)
	age	0.0190*** (0.000)	0.0194*** (0.000)	0.0182*** (0.000)	0.0214*** (0.000)	0.0214*** (0.000)
	urbano	-0.0791*** (0.001)	-0.0734*** (0.001)	-0.0576*** (0.001)	-0.0730*** (0.001)	-0.0715*** (0.001)
	asians	-0.0145** (0.006)	-0.0111* (0.006)	-0.00296 (0.006)	-0.00107 (0.008)	-0.000748 (0.008)
	brown	0.00940*** (0.001)	0.00534*** (0.001)	0.00218*** (0.001)	0.00136* (0.001)	0.00118 (0.001)
	black	0.00705*** (0.001)	0.00310** (0.001)	-0.000697 (0.001)	-0.00171 (0.002)	-0.00119 (0.002)
	famincome		-0.00514*** (0.000)	-0.000622* (0.000)	-0.00231*** (0.001)	-0.00184*** (0.001)
	familysize		0.00310*** (0.000)	0.00312*** (0.000)	0.00386*** (0.000)	0.00385*** (0.000)
	Mother's variables	agemom			-0.0000262 (0.000)	-0.0000701 (0.000)
mothereduc				-0.00216*** (0.000)	-0.00274*** (0.000)	-0.00262*** (0.000)
CLmom				0.0433*** (0.001)		
CLmombelow9					0.0561*** (0.001)	
CLmom10-14					0.0333*** (0.001)	
CLmom15-17					0.0114*** (0.001)	
CLmomage						-0.0100*** (0.000)
CLmomage squared						0.000186*** (0.000)

Note: Standard errors calculated using the delta method is in parentheses; ***, ** and * denote significance at 1%, 5% and 10%, respectively.

The group variable that controls for the age group at which individuals' mothers started work provides more detail concerning the trap. The estimate for CLmom0-9 indicates that the probability of *child labor trap* is highest among children whose mothers started working at or before the age of 9 compared to those whose mothers entered the labor market at later ages. Curiously, the marginal risk of the trap drops from 5.63 to 3.45 percentage points (p.p.) as the mother's entrance in the labor market is postponed to the age group of 10-14 (indicating reduction of about 39%). Further deferral of mother's entrance in the labor market to the age bracket of 15-17 provoked greater reduction of this risk from 3.45 p.p. to 1.08 p.p. (reduction of almost 69%).

What can be deduced at this point, which is innovative to previous studies, is that

the later an individual enters the labor market the less likely he/she is induced to send children to work. The coefficient for `CLmom18-19` appears negative, indicating a non-linear relationship between the probability of child labor and the age at which mothers started working. Thus, the model points that children from parents who enter the labor market at this age tend to be involved in other activities other than work.

The suspicion of non-linear relation in model IV incited the control of the `CLmomage` and `CLmomage squared` in model V so as to calculate the specific age in which this *tip-ping point* falls. Not surprisingly, the sign for these variables were negative and positive, respectively. Moreover, having an expressively low value for `CLmomage squared` it is deducible that the function is more likely to be asymptotic and not quadratic. Nevertheless, we found that the minimum point of this function is reach at about the age of 26.9. Thus, this model shows that the probability of children to work is close to null if parents started working at the age of 26.9. Note that it is around this age at which large number of Brazilian students complete their undergraduate studies.

For illustration of this result, Fig. 20 presents the marginal effect of the age at which mothers started working on the probability of their children to work. Clearly, the relationship is negative, asymptotic and minimum at age 26.9. Thus, every additional year of postponement of entry into the labor market reduces the risk of child labor trap till its minimum. Aside the calculated marginal effects represented by the continuous line, we also presented the confidence interval for the same, which is represented by the broken lines. Notably, the extremely straight intervals indicate that estimate are very precise.

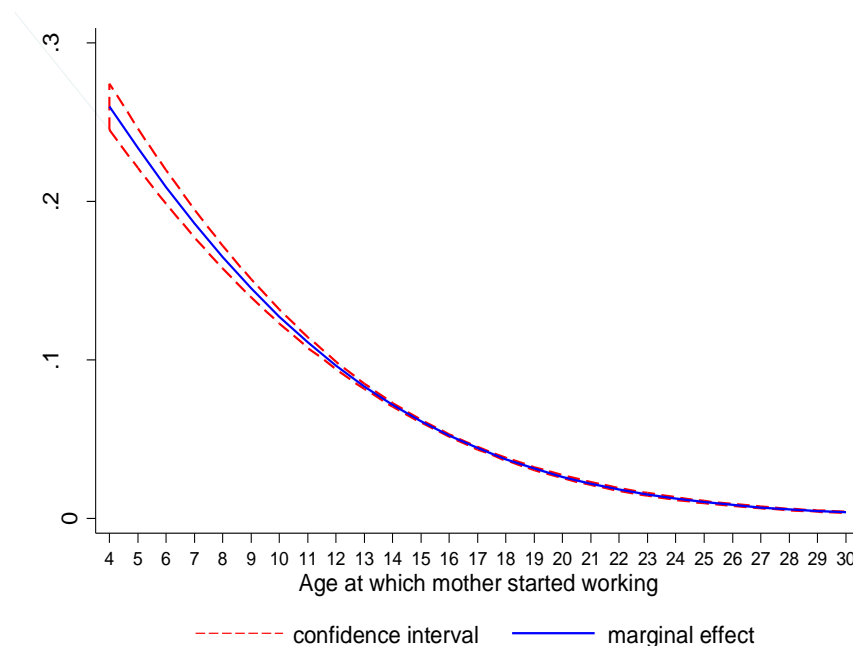


Figure 20 – Marginal effect of the age at which mothers started working.

Source: Prepared using estimates from model I in Table 8.

Note: The continuous line is the estimated marginal effect and the broken lines represent confidence interval.

Curiously, Justus *et al.* (2012) found a similar result for the best age to enter the labor market. Specifically, these authors found that the hourly earnings from work is maximum when males and females start working at age 27.3 and 22.6, respectively. Therefore, our result corroborates that found by these authors that the minimum age for work set at 14 is, still, low to eradicate the negative impact of child labor in adulthood.

In short, the result found in this essay provides evidence which corroborates previous literature concerning child labor trap. Specifically, we found that the probability of a child to work is negatively related to the age at which his/her parents started working. Most importantly, our empirical result does not permit to reject the hypothesis that child labor cycles can be reverted if the minimum age for work is increased.

5 Child Labor Hazard on Mental Health

Child labor is usually deemed to negatively affect health. However, most of the studies which investigate this hypotheses only considered the physical health. As novel contribution, we allege the hypothesis that the impact of child labor transcends physical to the mental health of individuals. Specifically, in this chapter, we investigate the probability of individuals who work or worked during childhood to develop symptoms of mental depression during adulthood. Moreover, we also innovate in the sense of accounting for possible genetic or maternal causal effects among family members. For this essay, we used the 2008 PNAD and its special supplements to estimate probit models. Empirical results sustained the hypothesis that work during childhood is positively related to the risk of developing mental depression in adulthood. Alongside, we found that family health status and chronic physical illness in individuals play substantial role in determining their risk of developing mental depression.

Depression is one of the alarming health challenges the world faces. Still, basic health services to tackle mentally illness are scarce and even non-existent in many developing countries. In the Economist Events' conference held on the 25th of November of 2014, key global opinion leaders from diverse fields supported that despite depression being a global crises, nations still fail to grasp the scale and urgency of the problem. In short, depression still loses to physical health problems in the priority list of most governments and policy makers.

Depression is a mental disorder characterized by depressed mood, loss of interest or pleasure, decreased energy, feelings of guilt or low self-worth, disturbed sleep or appetite, and poor concentration. In most chronic cases, depression comorbid with anxiety and impairs individuals of the ability of exercising their daily routines. Moreover, in worst cases depression may lead to suicide (MARCUS *et al.*, 2012).

According to The Economist (2014), mental disorders do not only affect the mood, intellectual and cognitive abilities of an individual, but also provokes severe consequences to the society and economy as a whole. In the same report, information was provided that about 4% of the GDP of the OECD countries is loss to mental illness, especially due to productivity loss. Only in the UK, about 148 million working days are lost due to depression, leading to yearly economic cost burden that ranges from 70 to 100 billion Euros, whereas about 63% of this value is due to indirect cost, most especially loss of

productivity, and only a modest percentage is spent on direct treatment for patients (about 1% for psychotherapy and 3.5% for medications). Furthermore, the same report provided that among all depressed patients, only 30 to 52% have contact with any health professional, whereas only 8 to 16% of these contact mental health specialist and, yet, only about 10% receive minimally adequate treatment. This report also alerted that the scale of the problem is steadily rising and has already, in 2010, exceeded the WHO projection for 2030 and that the health apparatus to tackle the same is minimal. Thus, it is highly important to investigate the determinants of mental depression so as to give directions to policy makers concerning measures to adopt to tackle the same and, thus, avoid huge social and economic costs.

According to the Brazilian National Household Sample Survey data (PNAD), the rate of mental depression in Brazil slightly reduced over time – from 4.96% in 1998 to 4.13% in 2008 (JUSTUS *et al.*, 2012). Nevertheless, these figures are still high and worrying because depression morbidity continues high among Brazilians. Specifically, Silva *et al.* (2014) showed that one in seven Brazilians has symptoms of mental depression and one in twelve has a twelve-month chronic mental disorder. Still, according to Gonçalves *et al.* (2012b), only about 2.5% of the total annual federal health expenditure is allocated for mental health treatments. Therefore, alike in other OECD countries, depression has not been ranked among the major health concerns in Brazil. Taking the observed magnitude of the problem and acknowledging the underestimation of the same, it is expectation that the social and economic consequences of the same to be alarming. However, it is noteworthy that the Brazilian government has adopted innovative measures to reach greater number of mentally ill patients. One of which includes higher resources allocation to remote communities and adoption of territorial health care systems. These measures enhance the access and reach of greater number of population who have depressive symptoms.

Despite the numerous empirical efforts to investigate the causes of depression in literature, very little is consolidated concerning depression in children and adolescents. This is partly due to the difficulty of diagnosing mental illness in younger individuals. WHO (2001) asserts that recent health studies have indicated positive correlation between childhood trauma and individuals' behaviors during adulthood such as usage of drugs, alcoholism, depression, suicide, greater propensity to illness and lower life expectancy.

In the literature, child labor is defined as children's engagement in labor activities which cause harm to physical or mental health, or moral development. However, according to Guarcello *et al.* (2004), "the literature is richer in hypothesizing negative effects of child work on health than it is in testing these hypotheses". So far, there is no empirical study which tested the hypothesis of the assumed negative effect of child labor on mental health. Thus, in this essay we seek to provide the first empirical evidence concerning this relationship. Specifically, we aim to test the hypothesis that work during childhood

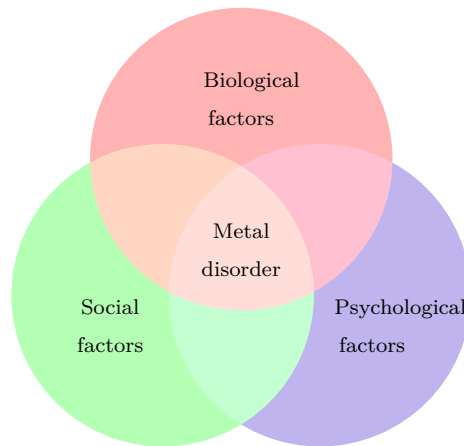


Figure 21 – Decomposition of the causes of mental depression
Source: WHO (2001)

increases the risk of individuals to develop depressive symptoms during adulthood. This hypothesis is rooted in the argument that stress and pressure in very early stages in life as result of child labor may lead to mental disorder, especially through three channels: a) biological path: genetics and high Cortisol¹ level; b) psychological path: insufficient nurture, anxiety, grief and pressure; and c) social path: social stigma, poverty and low education.

This essay is organized as follows: Section 5.1 presents previous studies concerning the determinants of mental depression; Section 5.2 provides details concerning data and empirical model, and; Section 5.4 presents descriptive analysis and empirical results.

5.1 Literature Review

Due to the novelty of the hypothesis which we seek to test in this chapter, no previous empirical studies was found concerning the impact of child labor on the probability of individuals to develop mental depression. Thus, in this section we review the determinants of mental depression from Brazilian and international literature.

As illustrated by WHO (2001) in Fig. 21, mental depression, alike most physical illness, is the aftermath of the complex and interwoven combination of biological, psychological and social factors. Thus, the detection and isolation of the individual effect of each factor is a common challenge in health and socioeconomic literature. In this sense, The Economist (2014) informs that the investigation of the causes of depression requires a multi-faceted approach that ranges from health to psychology as well as socioeconomic literature.

¹ Cortisol is an hormone which eats up the brain if secreted for long-term. (DIBATTISTA *et al.*, 2005). Still, Hodges e Sadow (1969) concluded that long term secretion of cortisol has potential impact in retarding growth.

Regarding biological factors, health studies have repeatedly confirmed the influence of genetics in the determination of mental health risks of individuals. Lohoff (2010) and Ledford (2015) pointed that the gene is a means through which mental depression is intergenerationally transmitted. However, WHO (2001) pointed that the effect of genetic factors tends to be heightened if combined with psychological or environmental factors such as malnutrition, infections, disrupted family environments, neglect, isolation and trauma. Moreover, a biological path through which child labor may lead to mental depression is stress. According to Woodhead (2004), stress due to environmental pressures may significantly alter the level of hormones, immunity and cortisol in individuals, which may lead to depressive symptoms especially in children. For children, moderate level of stress from, for example, school is tolerable. Thus, children who work or conciliate work with study tend to face excessive level of stress due to unnecessary demands and pressures from themselves and from employers.

The role of psychological factors in determining the risk of mental depression has been, for long, confirmed to be vital by health researchers. WHO (2001) and Sokolova (2003) highlighted the relationship with parents or caregivers during childhood as a major factor which molds an individual's mind, intellect, emotional regulation, and behavior. Therefore, children who had poor or insufficient nurture during childhood due to illness, separation, death or mental health problems of parents or caregiver have high risk of developing mental dysfunctions, either during childhood or later in life. According to WHO (2001), evidence regarding these risk factors were observed in children who live in institutions despite not being deprived of nutrition and bodily care. Mental disorders have also been confirmed to be associated to physical health. Specifically, physical incapacities may cause grief or inferiority complex, which may affect the psychological balance of individuals.

Other important psychological determinant of mental disorder is the failure to cope adaptively to a stressful way of life. Here is a path through which child labor comes in. Children and adolescents who work at early age prematurely face stress from work, which are, at times, arduous, time consuming and hazardous. It is worthwhile to note that aside stress from labor activities, children and adolescents also face stress through pressures or abuses from employers. Generally, these these individuals are forced to prematurely internalize the role or providing for family or self needs. In such cases, children tend to be psychologically affected when they do not meet such goal.

The bigger problem is that most parents and empirical studies do not consider the stress related to study. According to WHO (2001), learning, for children, may be quite as stressful as work itself, especially when it comes to learning unfamiliar subjects – which is basically what all child does in early stages of life. Thinking of it, most adults work with familiar and recurrent activities and generally complain about the stress from work.

However, most children, right at early ages, recurrently deal with diverse and unfamiliar subjects under pressure of getting good grades and, at times, not even knowing the importance of why they learn these subjects. In most cases, after these children spend almost half of the day trying to learn unfamiliar subjects, they get home filled with the joy of leaving school and meeting loved ones. Unfortunately, such joy and revived energy is, at times, conceived by parents as sign of idleness in school. As a result, children are nonchalantly sent to do house chores or, in worst-case scenario, to work. In fact, most adults choose to simply ignore or neglect the fact that learning is also psychologically stressful.

In cases when children conciliate study with work, the psychological strain is higher since they have to adapt to scenarios which are completely different from that of schooling. Unfortunately enough, such children return to school the next day to face learning pressure from teachers, who are simply performing their tasks. As aftermath, children tend to show low academic performance in school. On the one hand, teachers who do not know of the daily schedules of the child end up concluding regarding the natural academical aptitude of the child. On the other hand, parents either concur with this point of view or simply conclude regarding the inefficiency of the education system. In cases where work is conceived as a positive phenomenon, such children end up being enrolled as work apprentice. According to Magara (2005) and Aliyu (2006), in African countries, male children withdrawn from school are enrolled as apprentice in local mechanic or carpentering workshops or in construction sites. Meanwhile female children are enrolled as housekeepers, maids, tailors or vendors.

Although biological and psychological factors are important factors which cause stress from within the individual, external social factors also play fundamental role on mental health. Examples of such social factors are urbanization, poverty, technological change, economic development, unemployment, level of education, racism, ethnicity, social stigma and gender and sexual discrimination (WHO, 2001).

Urbanization, which is highly related with economic development, is a desired feature in this modern world. However, Justus *et al.* (2012) pointed that its nature may be deleterious to mental health. This is because urbanization is, generally, accompanied with greater number of stressors such as violence, inequality, pollution, traffic congestion, overcrowding, frustration, dependence on a cash economy, among many others. However, rural areas also have shortcomings such as isolation, lack of quality communication, transport and health facilities, low economic and educational opportunities, etc.

Level of poverty also influences the risk of developing mental depression (WHO, 2001). Justus *et al.* (2012) using pooled sample of 1998, 2003 and 2008 PNAD data estimated models of the determinants of mental depression in Brazil. Despite observing empirical evidence of positive relationship between poverty and mental depression, these

authors pointed that such relationship may not be linear. To account for this, poverty was controlled by classifying family income into distribution deciles. The reason for a positive impact of poverty is that, in most cases, poor individuals who do not have sufficient means to cover necessary expenses may suffer frustration or grief, leading to mental imbalance. According to WHO (2001), nowadays, in consumerist societies where mere incapacity to acquire certain material objects or consume certain services may lead to social exclusion or discrimination, poor individuals are prone to suffer social stigma. Such social stigma may be internalized as inferiority complex or as impostor syndrome, making such individuals to feel as if they do not fit in the society.

An interesting characteristic in the study of Justus *et al.* (2012) is that separate equations were estimated for men and women due to observed gender disparity. In accordance with most health studies, these authors found evidence regarding higher incidence of mental depression in women compared to men. Astbury (1999) alleged that such disparity may occur because of the intense role that women play as mothers, wives, educators and care givers, workers and not to mention the social discrimination and chauvinism which they face in the society.

Justus *et al.* (2012) also found a non-linear relationship for the effect of education and age on mental health. Specifically, the distribution of the risk of mental depression as to age and level of education is a parabolic curve with downward opening. As for age, this risk reaches its maximum at about the age of 43.8 for women and 47.8 for men. As for level of education, the risk reaches its maximum roughly at 4 years of schooling for women, while at 8 years for men.

Intuitive reflection may induce to think of a positive relationship between adult work and mental depression due to stressors such as overwork and pressure. However, one has to have in mind the “pain” of unemployment, which only get worse over time. The combination of the feeling of lack of belongingness in the society, financial dependence on family members and incapacity to meet material needs, when internalized, may lead to mental disorder in individuals. Thus, it is also reasonable to expect negative relationship between adult work and mental depression as a result of the psychological satisfaction of being employed. However, such argument is untrue concerning children and adolescents, since their labor is unregulated, badly remunerated and involves pressure and abuses.

Based on the observations from literature, we postulate that child labor may lead to mental illness through: biological path – increase in the level of cortisol, reduction of immunity levels and hormone imbalance as a result of stress; psychological path – lack of nurture, stress, anxiety, self-pressure or pressure from employer; social path – social stigma, poverty and low education.

5.2 Methodology

5.2.1 Data and Sample

In this essay, we used the 2008 PNAD data and its special supplements on health issues. Given the peculiarity of the objective of this essay, we had to filter the data sample (see Fig. 22).

The first filter was the exclusion of individuals below age 10, since only individuals above the age of 10 years were questioned concerning the age at which they started working. Still, we excluded individuals above the age of 35 so as to focus on adolescents and young adults. Therefore, our sample exclusively consist of individuals between age 10 and 35, keeping about 43% of the overall sample.

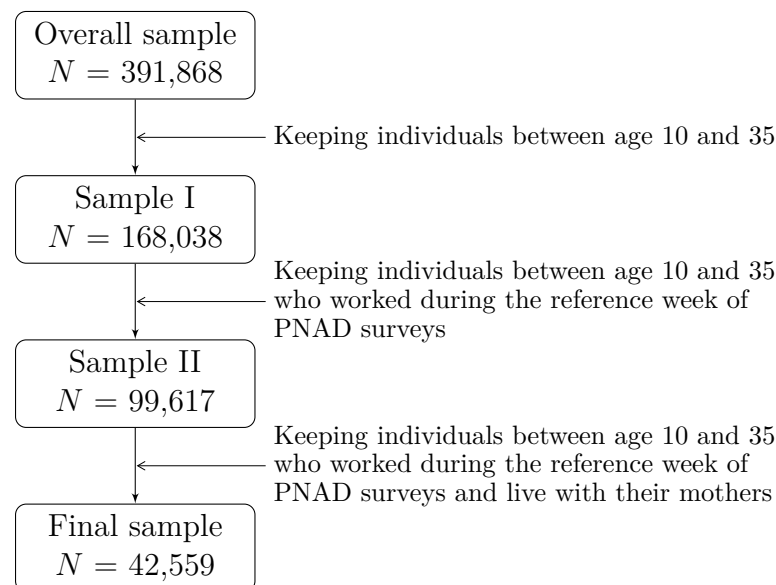


Figure 22 – Sample filtration

Source: Prepared by author

Note: N denotes number of observations

In order to account for individuals who were child laborers we had to use data concerning the age at which they started working. However, this control engendered an unavoidable filter to database since this information only covers those who were employed during the reference week of the PNAD surveys. As a result, about 40% of individuals were excluded from Sample I.

Furthermore, to control for family health characteristics using mother's variables as a *proxy*, we focused our essay on individuals who live with their mothers in the same household. Note that the PNAD survey only register as family those individuals who live in the same household and declare one another as family. The cost of such filter was relatively high (about 57% of Sample II) since most of the adults and elderly individuals do not live with their parents. In other words, our final sample limits analyses to young

adults. Specifically, about 6% of the individuals in this age group are between ages 10 and 14, about 59% are between ages 15 and 29, whereas less than 13% are above age 30 (see Table 9).

Table 9 – Frequency by age group

Age bracket	Frequência	%
10 – 14	2,715	6.38
15 – 17	5,561	13.07
18 – 19	5,853	13.75
20 – 24	14,122	21.34
25 – 29	9,080	10.81
30 – 35	4 868	1.48
Total	42,559	100.00

Source: Prepared using 2008 PNAD data.

Acknowledging that such filters may cause severe implication to analysis, we compare statistics from the overall and final samples in Table 10. Note that despite the expressive reduction of sample size, the mean and standard deviation of variables from the overall and final samples converge. Admitting this weakness concerning data, we emphasize the unavailability of alternative database that contains information regarding mental health of individual. Furthermore, note that this essay constitutes the first empirical exercise which relates child labor to mental depression and also controls family health characteristics.

From this table, we observe that about 1,5% of the population comprised in the sample were diagnosed with mental depression by a doctor or physician in 2008. Regarding the *proxy* variable to control for family genetics (*depmom*), approximately 10.1% of the individuals between age 10 and 65 have mentally depressed mothers.

As to chronic physical disease, about 13% of the individuals had at least one chronic physical disease. However, this proportion is higher among mothers contained in the sample (about 57%). It is interesting to note that about 48% of the individuals work or worked as child laborers. At this point, one perceives that child labor and, most likely, its long-run consequences continue present in the Brazilian society.

Similarly to previous chapter, all estimates were computed using the weights or sample expansion factors provided by the IBGE in the data files.

5.2.2 Empirical Model

Our empirical model specification is based on that of Justus *et al.* (2012) so as, thereafter, make necessary and substantial contributions. As contribution to this study, we verify if there is relationship between child labor and mental depression. Furthermore,

Table 10 – Summary statistics

			Filtered sample		Overall sample	
			Mean	Std.Dev	Mean	Std.Dev
Variables of interest	depress	1 if depressed and 0 otherwise	0.0155	0.1237	0.0196	0.1388
	childlabor	1 if he/she is or was a childlaborer and 0 otherwise	0.4813	0.4997		
	CL0-14	1 if he/she worked before age 14 and 0 otherwise	0.3084	0.4619		
	CL15-17	1 if he/she worked at age 15-17 and 0 otherwise	0.3166	0.4652		
	CL18-19	1 if he/she worked at age 18-19 and 0 otherwise	0.1876	0.3904		
	CL20-24	1 if he/she worked at age 20-24 and 0 otherwise	0.1080	0.3104		
	CL25-29	1 if he/she worked at age 25-29 and 0 otherwise	0.0131	0.1138		
	CLabove 30	1 if he/she worked at age 30 or above and 0 otherwise	0.0014	0.0378		
Control variables	depmom	1 if mother is depressed 0 otherwise	0.1012	0.3016		
	chronmom	1 if mother has physic. Chronic disease and 0 otherwise	0.5722	0.4948		
	male	1 if male and 0 if female	0.6109	0.4875	0.5326	0.4989
	yellow	1 if skin color is yellow and 0 otherwise	0.0042	0.0647	0.0042	0.0643
	white	1 if skin color is white and 0 otherwise	0.4462	0.4971	0.4398	0.4964
	black	1 if skin color is black and 0 otherwise	0.0713	0.2574	0.0682	0.2522
	brown	1 if skin color is brown and 0 otherwise	0.4825	0.4997	0.4919	0.4999
	urban	1 if he/she resides in urban area and 0 otherwise	0.8301	0.3755	0.8479	0.3591
	midwest	1 if he/she resides in the Midwest and 0 otherwise	0.1053	0.3070	0.1053	0.3069
	northeast	1 if he/she resides in the Northeast and 0 otherwise	0.3302	0.4703	0.3368	0.4726
	north	1 if he/she resides in the North and 0 otherwise	0.1207	0.3258	0.1288	0.3350
	southeast	1 if he/she resides in the Southeast and 0 otherwise	0.3012	0.4588	0.2921	0.4548
	south	1 if he/she resides in the South and 0 otherwise	0.1425	0.3496	0.1369	0.3438
	chronic	1 if he/she has physic. Chronic disease and 0 otherwise	0.1314	0.3379	0.1389	0.3459
	study	i if he/she is enrolled in school	0.3653	0.4815	0.5787	0.4938
	age	Age	22.37	5.52	20.78	9.85
	age(square)	Age square	531.15	257.87	528.90	574.46
	work	1 if he/she currently works	0.8822	0.3224	0.4314	0.4953
	hourwork	Weekly working hours	32.92	17.55	16.22	20.64
	famincome	Average per capita family income	579.3	773.26	528.95	787.81
	famsize	Family size	4.3	1.66	4.36	1.62
	mothereduc	Mother's level of education (in years of studies)	7.03	4.53		
	agemom	Mother's age	49.09	8.99		

Note: Number of observations for overall and filtered samples are 101,454 and 42,559, respectively.

we innovate in the sense that mother's variables were controlled as *proxy* to account for possible genetic or maternal causal effect among family members.

Similarly to Chapter 4, probit models were estimated since the response variable, **depress**, is a dummy that assumes the value of 1 if individuals affirmed to be diagnosed by a doctor or medical practitioner to have mental depression and 0 if otherwise.

The regressor of interest is **childlabor**, which is a dummy variable that assumes 1 if the individual works or worked as child laborer and 0 if he/she doesn't or didn't. This variable was substituted by six dummy variables to control for the age bracket at which the individual started work: **CL0-14** (reference group), **CL15-17**, **CL18-19**, **CL20-24**, **CL25-29** and **CLabove 30**. We controlled for mother's mental health status with a dummy variable which is 1 if the individual's mother was diagnosed with mental depression and 0 if otherwise (**depmom**). This variable served as *proxy* for family genetics since the PNAD data does not provide data concerning other members of the family. In addition, we control for mother's physical health status using a dummy variable which is 1 if the individual's mother has at least one chronic physical disease² diagnosed by a doctor and 0 if otherwise (**chronmom**).

The other control variables are: number of family members (**famsize**); average per capita family income (**famincome**); individual's mothers age (**agemom**); dummy variable which is 1 if the individual has at least one chronic physical disease and 0 if not (**chronic**); dummy variable which is 1 if the individual is enrolled in school and 0 if not (**study**); a dummy variable for individual's gender which is 1 if male and 0 if not (**male**); individual's age (**age**) and its square; dummy variable which is 1 if the individual works and 0 if he/she doesn't (**work**); number of individual's weekly working hours (**hourwork**); dummy variable which is 1 if the individual lives in an urban area and 0 if he/she doesn't (**urban**); five dummy variables to control for skin color³(**white** as base group, **asian**, **black** and **mulatto**)⁴, and; five dummy variables to control for regional difference (**south** as base group, **southeast**, **midwest**, **northeast** and **north**).

Some variables are suspected to be endogenous. For example, work variables (**work** and **hourwork**) can influence the likelihood of an individual to develop symptoms of mental depression due to pressure and work intensity. However, a depressed individual is prone to be jeopardized in his/her working place as a result of productivity loss which, in turn, can cost him/her his job. Similarly, **study** and **famincome** are also suspected to be

² The chronic physical diseases considered are: chronic back or spine problem, arthritis or rheumatism, cancer, diabetes, bronchitis or asthma, hypertension, heart disease, chronic renal dysfunction, tuberculosis, tendonitis or tenosynovitis, and cirrhosis

³ The Brazilian Institute of Geography and Statistics (IBGE) classifies race/skin color according to physical appearance which is self-declared by individuals. These categories are: white, black, yellow (Asian-Brazilians), brown (Mulatto) and indigenous.

⁴ Indigenous population were excluded due to the small number of observations

endogenous. However, the endogeneity of the later variable depends on the weight of the individual's income in the family income composition. As observed by Justus *et al.* (2012), the effect of family income on the risk of mental depression is not linear, for this reason the average per capita family income was logarithmized. Furthermore, these authors point that the relationship between an individual's age and his/her risk of developing symptoms of mental depression is non-linear. For this reason, the square of age is included in the model specification.

5.3 Descriptive Analysis

As discussed in Section 5.1, work at tender ages, irrespective of the sector or region, may have deleterious effect on the human capital accumulation or health of individuals. Focusing on mental health, Fig. 23 relates the incidence of mental depression and the age at which individuals started working using 2008 PNAD data.

With brief glance, one perceives that the distribution is skewed left. In other words, most individuals who were diagnosed with mental depression started working at early ages, thus, indicating a positive relationship between child labor and mental depression. It is interesting to observe that the incidence of mental depression reduced expressively from the age bracket of 10-14 to 15-17 and from 18-19 to 20-24. Intuitively, this observation points that the risk of mental depression reduces remarkably for individuals who start working after the minimum age for work as apprentice (at age 14) and such reduction is more pronounced for those who start working after the minimum age for night, hazardous or unhealthy works (at age 18). In short, through this figure, we clearly observe higher risk of mental depression in individuals who were child laborers.

Table 11 presents the cross-frequency between some regressors and mental depression. About 1.6% of the individuals who worked as child laborers were diagnosed with mental depression by a physician or health practitioner in the year 2008. Moreover, we also observe that this incidence is higher among these individuals compared to those who were not child laborers. As pointed by WHO (2001) and empirically verified by Justus *et al.* (2012), chronic physical illness such as cirrhosis, cancer, tuberculosis, renal or heart diseases, etc. may lead to mental depression through the psychological or biological channel. In year 2008, approximately 5.3% of the individuals with chronic physical illness were diagnosed with mental depression. In accordance with these studies, it is clear that the incidence of mental depression is way higher among women (about 2.4%) compared to men (about 1%).

Still on the individual's personal characteristics, Table 11 clarifies regarding higher incidence of mental illness among individuals who are neither enrolled in school nor employed. Moreover, higher was also observed among white-skinned population compared

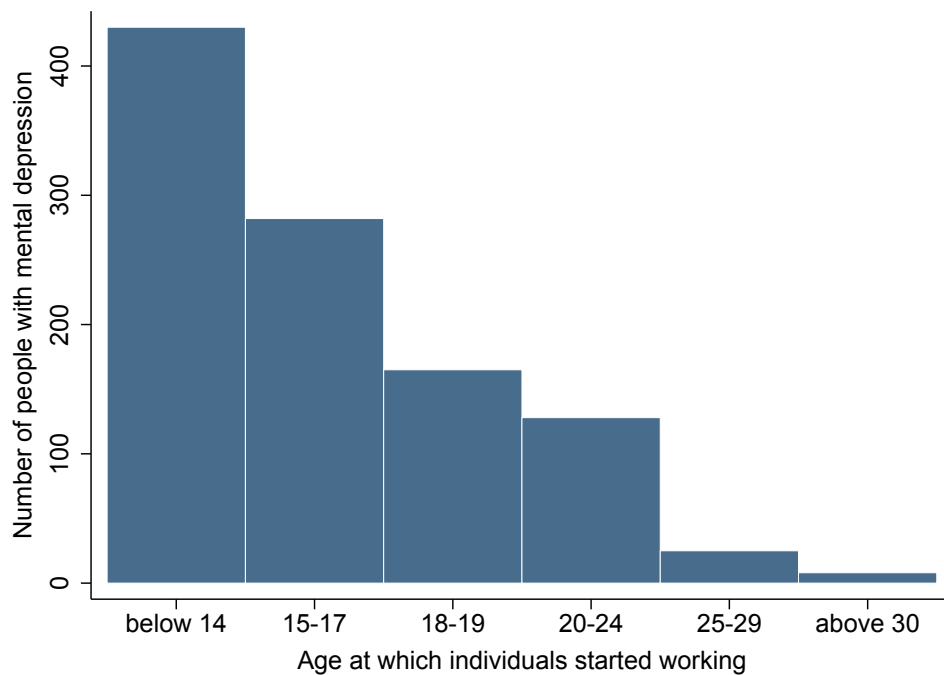


Figure 23 – Number of people with mental depression by the age at which they started working

Source: Prepared using 2008 PNAD data

to mulattos, blacks and Asians. In line with Justus *et al.* (2012), there were expressively more cases of mental depression in urban areas, compared to the rural ones. In addition, regional variables show greater incidence of mental depression in the Southern and Southeast region compared other regions. Intuitive analysis of the ranking of this regional distribution leads to think of higher incidence of mental depression in more developed and colder regions, which eventually corroborates the results of these authors.

The two family variables, **depmom** and **chronmmum**, are considered to serve as control for biological (genetics) and psychological (affection) paths through which mental depression may be passed from parents to offspring. On the one hand, based on WHO (2001), individuals may develop symptoms of mental depression as a result of affection for loved ones who are diagnosed with mental depression or chronic physical illness. On the other hand, based on Lohoff (2010) and Ledford (2015), mental depression may arise as a result of family genetics. Quantitatively, about 2.1% of the individuals who were diagnosed with mental depression had mothers with chronic physical illness, while about 5.6% of the same individuals have mentally depressed mothers. This indicates that the relationship between mental depression among family members is stronger than that of physical chronic illness with mental depression.

Table 11 – Percentage of mentally depressed and non-depressed individuals by category of variables

Variable		Mentally depressed (%)		Number of observations
		No	Yes	
Child labor	No	98.43	1.57	22,075
	Yes	98.46	1.54	20,484
Chronic illness	No	99.01	0.99	36,966
	Yes	94.73	5.27	5,593
Gender	Female	97.64	2.36	16,558
	Male	98.96	1.04	26,001
Enrolled in School	No	98.21	1.79	27,012
	Yes	98.86	1.14	15,547
Employed	No	97.41	2.59	5,014
	Yes	98.59	1.41	37,545
Skin color	white	97.96	2.04	18,990
	black	98.95	1.05	3,036
	mulatto	98.82	1.18	20,533
	Asians	98.88	1.12	179
Mother with chronic illness	No	99.17	0.83	18,207
	Yes	97.91	2.09	24,352
Mother with mental depression	No	98.91	1.09	38,252
	Yes	94.36	5.64	4,307
Urbanization	urban	98.34	1.66	35,329
	rural	98.98	1.02	7,230
Region	Midwest	98.35	1.65	4,483
	Northeast	99.01	0.99	14,053
	North	99.44	0.56	5,136
	Southeast	98.07	1.93	12,821
	South	97.16	2.84	6,066
Number of observations		41,898	661	42,559

Note: Prepared using 2008 PNAD data.

5.4 Analysis of Empirical Results

The hypothesis that we analyze in this section is that work during childhood increases the risk of individuals to develop depressive symptoms during adulthood. The empirical strategy used to reach this objective is the probit model estimated by maximum likelihood. For details concerning probit models consult in Section 4.3.2 of Chapter 4 and also in Greene (2003).

The coefficients observed from the probit models are presented in Table 12. However, we focus our analysis on the marginal effects presented in Table 13, which were calculated for discrete changes in dummy variables and at means for continuous variables.

The first general perception from this table is that the standard errors observed for all variables are extremely small.

Moreover, that the signs obtained for each statistically significant variables from all models corroborates the expectations which were set based on the literature survey presented in section 5.1. In model I, all the specified variables were included. In model II, the same model was estimated without mother's variables (`depmom`, `agemom` and `chronmom`). What we observe is that without these control variables, other estimates are overestimated. Aside this, the pseudo- R^2 dropped from 0.157 to 0.120 and the LR test indicated that Model I is better adjusted.

Subsequently, model III was estimated with all variables in Model I, but dropping those which were suspected to be endogenous as justified in Section 4.3.2. Aside the estimates of other variables being slightly overestimated without the control of `study`, `famincome`, `work` and `hourwork`, the pseudo- R^2 and the LR test indicated that model I is better. Having that other estimates were not gravely affected after dropping these variables, we opted to continue with model I.

Lastly, we estimate model IV, which is a similar version of model I. However, the child labor variable was substituted by age groups which controls for the age bracket at which individuals started working. This group dummy variable is more informative than `childlabor` since it provides the marginal effect concerning each age group. Comparing Model I to model IV, it is notable that there was slight increase of the pseudo- R^2 and the LR test indicates that model V is better. Hence, the main interpretations will be based on this model.

Table 12 – Results of Estimation (coefficients)

Response variable: depress					
Category of regressors		I	II	III	IV
Family's variables	log(famincome)	−0.0544** (0.023)	−0.0633*** (0.023)		−0.0513** (0.024)
	famsize	−0.0365*** (0.012)	−0.0475*** (0.012)	−0.0320*** (0.012)	−0.0368*** (0.012)
Mother's variables	depmom	0.605*** (0.043)		0.607*** (0.043)	0.604*** (0.043)
	agemom	0.00320 (0.003)		0.00330 (0.003)	0.00306 (0.003)
	chronmom	0.127*** (0.044)		0.134*** (0.043)	0.127*** (0.044)
Individual's variables	chronic	0.601*** (0.040)	0.666*** (0.039)	0.606*** (0.040)	0.601*** (0.040)
	study	−0.0150 (0.049)	−0.0140 (0.047)		−0.0128 (0.049)
	age	0.0985*** (0.032)	0.0986*** (0.031)	0.0736** (0.030)	0.101*** (0.032)
	age squared	−0.00134** (0.001)	−0.00126** (0.001)	−0.000922 (0.001)	−0.00141** (0.001)
	male	−0.272*** (0.039)	−0.258*** (0.038)	−0.298*** (0.038)	−0.278*** (0.039)
	urban	0.0285 (0.058)	0.0412 (0.058)	0.0194 (0.057)	0.0563 (0.059)
	black	−0.193** (0.086)	−0.204** (0.085)	−0.160* (0.086)	−0.195** (0.086)
	mulatto	−0.0685 (0.043)	−0.0807* (0.042)	−0.0444 (0.042)	−0.0706 (0.043)
	work	−0.161** (0.081)	−0.177** (0.079)		−0.171** (0.081)
	hourwork	−0.00318* (0.002)	−0.00286* (0.002)		−0.00308* (0.002)
	Midwest	−0.179*** (0.067)	−0.229*** (0.065)	−0.176*** (0.066)	−0.183*** (0.067)
	Northeast	−0.345*** (0.060)	−0.433*** (0.058)	−0.300*** (0.058)	−0.350*** (0.060)
	North	−0.490*** (0.095)	−0.590*** (0.093)	−0.462*** (0.093)	−0.490*** (0.095)
	Southeast	−0.142*** (0.050)	−0.191*** (0.049)	−0.145*** (0.050)	−0.139*** (0.050)
	childlabor	0.0997** (0.041)	0.113*** (0.039)	0.108*** (0.040)	
	CL15-17				−0.180*** (0.049)
	CL18-19				−0.179*** (0.058)
	CL20-24				−0.145** (0.065)
	CL25-29				−0.0602 (0.133)
	CLabove 30				−0.479 (0.420)
	constant	−3.184*** (0.433)	−2.746*** (0.414)	−3.446*** (0.382)	−3.083*** (0.419)
<i>N</i>		42559	42559	42559	42559
Pseudo R^2		0.157	0.120	0.149	0.159
Log likelihood		−1489456.9	−1554577.3	−1502534.8	−1485823.0
LR χ^2 (degree of freedom)		783.2 (20)	660.8 (17)	752.7 (16)	794.4 (24)

Note: Standard errors in parentheses; ***, ** and * denote significance at 1%, 5% and 10%, respectively, and; N denotes number of observations.

Table 13 – Marginal effects for discrete changes in dummy variables and at means for continuous variables

Response variable: depress					
Category of regressors		I	II	III	IV
Family's variables	log(famincome)	−0.00194** (0.001)	−0.00233*** (0.001)		−0.00182** (0.001)
	famsize	−0.00130*** (0.000)	−0.00175*** (0.000)	−0.00115*** (0.000)	−0.00131*** (0.000)
Mother's variables	depmom	0.0320*** (0.003)		0.0325*** (0.003)	0.0319*** (0.003)
	agemom	0.000114 (0.000)		0.000118 (0.000)	0.000109 (0.000)
	chronmom	0.00435*** (0.001)		0.00460*** (0.001)	0.00433*** (0.001)
Individual's variables	chronic	0.0303*** (0.003)	0.0368*** (0.003)	0.0309*** (0.003)	0.0302*** (0.003)
	study	−0.000531 (0.002)	−0.000513 (0.002)		−0.000453 (0.002)
	age	0.00114*** (0.000)	0.00133*** (0.000)	0.000996*** (0.000)	0.00112*** (0.000)
	male	−0.00991*** (0.001)	−0.00974*** (0.001)	−0.0110*** (0.001)	−0.0101*** (0.001)
	urban	0.000996 (0.002)	0.00147 (0.002)	0.000688 (0.002)	0.00192 (0.002)
	black	−0.00587*** (0.002)	−0.00635*** (0.002)	−0.00503** (0.002)	−0.00592*** (0.002)
	mulatto	−0.00240 (0.001)	−0.00293* (0.002)	−0.00158 (0.001)	−0.00247* (0.001)
	work	−0.00639* (0.004)	−0.00738** (0.004)		−0.00682* (0.004)
	hourwork	−0.000113* (0.000)	−0.000106* (0.000)		−0.000109* (0.000)
	Midwest	−0.00554*** (0.002)	−0.00704*** (0.002)	−0.00549*** (0.002)	−0.00563*** (0.002)
	Northeast	−0.0106*** (0.002)	−0.0134*** (0.002)	−0.00942*** (0.002)	−0.0107*** (0.002)
	North	−0.0118*** (0.001)	−0.0135*** (0.001)	−0.0114*** (0.002)	−0.0118*** (0.001)
	Southeast	−0.00509*** (0.002)	−0.00715*** (0.002)	−0.00522*** (0.002)	−0.00497*** (0.002)
	childlabor	0.00358** (0.001)	0.00420*** (0.001)	0.00392*** (0.001)	
	CL15-17				−0.00608*** (0.002)
	CL18-19				−0.00578*** (0.002)
	CL20-24				−0.00465** (0.002)
	CL25-29				−0.00203 (0.004)
	CLabove 30				−0.0110* (0.006)

Note: Standard errors calculated using the delta method is in parentheses; ***, ** and * denote significance at 1%, 5% and 10%, respectively.

First, we analyze the effect of family health status. Results indicate that individuals who have mentally depressed mothers are more likely to develop symptoms of mental depression compared to individuals without mentally depressed mothers. The coefficient observed for the **depmom** variable had the highest value. Thus, the **depmom** turns out to be the most important factor which determines the risk of mental depression among all controlled variables. Quantitatively, children of mentally depressed mothers have about 3.2 percentage points (p.p.) higher risk of presenting symptoms of mental depression.

However, this incidence can be attributed to either biological factors (genetics) or psychological factors (grief, sadness, affection, etc.) that link a mother to child. However, this effects is further disentangled by observing the coefficient for **chronmmum** of which estimate is only about 0.3 p.p. Having that the marginal effect of mental depression of mothers (**depmmom**) is about five times the effect of chronic physical disease in mothers (**chronmmom**) and that both are considered chronic diseases/illness, one can suitably attribute the magnitude of **depmmom** to genetics. In so doing, we corroborate previous evidences concerning the role of genetic factors on the risk of developing mental depression⁵.

As emphasized by WHO (2001) and Justus *et al.* (2012), chronic physical diseases play important role in the risk of developing mental depression. Aside the direct impact on the psychological state of individuals, such illness also provoke loss of productivity, restriction to certain physical leisure and sport activities and also social discrimination. The combination of these factors can cause, when internalized, impostor syndrome or inferiority complex which, in turn, are potential causes of mental depression. The marginal effect found for **chronchild** indicates that individuals with any of the controlled chronic physical diseases have higher risk of being mentally depressed.

No empirical evidence was found at usual statistical significant levels concerning the effect of mother's age. However, it was observed that the risk of mental depression slightly increases as individuals grow in age, but is prone to reduce at old age. This is portrayed by the positive and negative signs found for **age** and **age squared**. This evidence buttresses results found by Justus *et al.* (2012) indicating that the risk distribution of mental depression by age group is a downward facing parabola.

According to Baker e Ashbourne (2002) and Abela e Hankin (2008), the incidence of mental depression varies widely between the male and female gender. The empirical evidence found in this study corroborates the findings of these authors that females are more likely to develop depressive symptoms compared to males. Furthermore, our empiric results also corroborate the relationship between family income and the risk of mental depression in the sense that it points to a negative relationship between both variables.

Statistical evidence also shows that residence in urban areas, skin color, family size and region of residence influence the risk of an individual to develop symptoms of mental depression. Regarding urban residence, results confirm higher incidence of mental depression in urban areas compared to rural areas, thus, corroborating findings of Justus *et al.* (2012). WHO (2001) reported that the nature of modern urbanization may have deleterious consequences on mental health as a result of higher incidence of stress, pollution, overcrowding, dependence on cash economy, discrimination, social class disparities and high violence. The group dummy variable for region of residence upholds this result, implying that the Southern Brazil, which is relatively highly urbanized, has higher inci-

⁵ See <<http://depressiongenetics.stanford.edu/mddandgenes.html>>

dence of mental depression compared to the Southeast, Midwest, Northeast and North regions. Curiously, the estimates for this group variables are distributed among regions according to their urbanization rate.

As per skin color, evidence upholds that observed by Justus *et al.* (2012) regarding the higher risk of mental depression among Brazilian white and Asian population compared to the mulatto and black-skinned population.

Although stress and pressure from work may cause depressive symptoms, the marginal effects observed for the **work** and **hwork** variables indicate that individuals who work, and inclusively, those who work more hours have lesser risk of mental depression compared to those who do not work. Despite this result corroborates findings from literature, we suggest better specification concerning types of work. This is because, on the one hand, work elevates self-esteem through social status and promotes more interpersonal interactions. The effect of higher interpersonal interactions is corroborated by the marginal effect found for **famsize** which implies that individuals from larger families have lesser risk of mental disorders. On the other hand, excess work or work that involves high pressure can lead to accumulation of stress, which is a potential cause of mental disorders. This is better portrayed when one considers the estimate for **childlabor**, since it generally involves unregulated pressure and working conditions.

The coefficient observed for this variable, which is of primary interest, indicates that individuals who work or worked as child laborer have higher risk of developing symptoms of mental depression compared to those who entered the labor market at adult age. This result corroborates the observation from Fig. 23 concerning higher incidence of mental depression among individuals who started working at early ages. Specifically, individuals who started working within the age group of 15–17 have about 0.6 p.p. lesser risk of developing mental depression compare to individual who worked within the age group of 10–14. Greater reduction is observed for individuals who worked at the age of 18–19. Analogously, compared to the reference group, individuals who entered the labor market between age 20 and 24 have lesser risk of mental depression. No statistical evidence was found regarding subsequent age brackets. Therefore, postponing entry into the labor market to the age of 14 is not enough to expressively reduce the risk of mental depression. This model suggests postponement to, at least, the age of 24, which is the average age at which most individuals finish undergraduate studies. Similarly to previous essay, our findings here also corroborates that of Justus *et al.* (2015) concerning the best age for individuals to enter the labor market in Brazil.

In Table 14, we simulate the risk of developing mental depression using estimates from model I. Specifically, we vary regressors concerning child labor, gender, skin color, urbanization and health status. Moreover, continuous regressors were fixed at means and other dummy regressors were fixed at zero during simulations. In other words, the average

individual of our analysis is assumed to be 25 years old, resides in the southern Brazil, not enrolled in school, but work for about 33 hours per week. Furthermore, this individual is from a family of four members with per capita income of about R\$ 604 and the mother is about 52 years of age.

For the first simulation exercise, we observed that, *ceteris paribus*, the risk of developing mental depression is about 0.8% for a white-skinned woman who resides in an urban area, was not a child laborer, does not have any chronic illness and her mother is neither chronically ill nor mentally depressed. However, we notice that this risk increases to 1.1% if the same woman worked during childhood. Curiously enough, this risk drops by half (about 0.5%) for a male individual with the same characteristics. For such a male individual, the risk of mental depression is about 0.6% if he resides in the urban area. Moreover, we confirm that white-skinned individuals have greater risk than mulattos and these have greater risk than blacks, despite all having identical characteristics in other aspects.

Having that majority of the individuals contained in the sample are mulattos, we continue the simulation exercise with these – a mulatto who is male, resides in an urban area and was a child laborer. As per physical health, our model indicates that such individual has the risk of about 2.2% if he has any chronic physical illness. This risk increases expressively to about 7.7% if, aside such illness, the individual's mother is mentally depressed. Moreover, if his mother is not only mentally depressed, but also has chronic physical illness, the risk increases to about 9.6%.

Table 14 – Prediction of mental depression risk

Individual characteristics						Family health status		$p(\text{depress})$
childlabor	male	urban	black	mulatto	chronic	depmom	chronmum	
0	0	0	0	0	0	0	0	0.0084
yes	0	0	0	0	0	0	0	0.0109
yes	yes	0	0	0	0	0	0	0.0053
yes	yes	yes	0	0	0	0	0	0.0057
yes	yes	yes	yes	0	0	0	0	0.0033
yes	yes	yes	0	yes	0	0	0	0.0047
yes	yes	yes	0	yes	yes	0	0	0.0221
yes	yes	yes	0	yes	yes	yes	0	0.0767
yes	yes	yes	0	yes	yes	yes	yes	0.0960

Note: $p(\text{depress})$ is the risk of mental depression; continuous variables which are not included in this table were fixed at means and other dummy variables were fixed at zero.

For subsequent simulation exercises, we predicted all possible combinations of variables and sorted by their respective risk values. In Table 15, we present combinations which resulted in mental depression risk above 10%. The objective here is to observe the characteristics of individuals who have the highest risk of developing mental depression.

Curiously, all cases of highest risks of mental depression have co-existence of chronic physical illness of individuals and mental depression of mothers. Still, we observe that high risk of mental depression is common among women, child laborers and

individuals whose mothers have chronic physical illness.

In short, our findings from this essay permits not to reject the hypothesis that individuals who work or worked during childhood have higher risk of developing symptoms of mental depression during adulthood. Moreover, we provide empirical evidence concerning the significant role of family biological and psychological linkages on the mental health of individuals. Still, our results also corroborate previous literature concerning the preeminence of mental depression among women and the adverse impact of chronic physical illness on the mental health of individual.

Table 15 – Combinations of variables for mental depression risk above 10%

childlabor	Individual characteristics					Family health status		$p(\text{depress})$
	male	urban	black	mulatto	chronic	depmom	chronmum	
yes	0	yes	0	0	yes	yes	yes	0.1645
yes	0	0	0	0	yes	yes	yes	0.1578
0	0	yes	0	0	yes	yes	yes	0.1487
yes	0	yes	0	yes	yes	yes	yes	0.1424
0	0	0	0	0	yes	yes	yes	0.1417
yes	0	yes	0	0	yes	yes	0	0.1358
yes	0	0	0	yes	yes	yes	yes	0.1357
0	0	yes	0	yes	yes	yes	yes	0.1299
yes	0	yes	yes	0	yes	yes	yes	0.1274
yes	0	0	0	0	yes	yes	0	0.1225
0	0	yes	0	0	yes	yes	0	0.1219
0	0	0	0	yes	yes	yes	yes	0.1218
yes	yes	yes	0	0	yes	yes	yes	0.1170
yes	0	yes	0	yes	yes	yes	0	0.1164
yes	0	0	yes	0	yes	yes	yes	0.1159
0	0	yes	yes	0	yes	yes	yes	0.1106
yes	0	yes	yes	yes	yes	yes	yes	0.1096
0	0	0	0	0	yes	yes	0	0.1078
0	0	yes	0	yes	yes	yes	0	0.1045

Note: $p\text{depress}$ is the risk of mental depression; continuous variables which are not included in this table were fixed at means and other dummy variables were fixed at zero.

6 Conclusions and Proposals

This master's thesis, which is divided in four independent essays, provides substantial contributions concerning the determinants, dynamic and consequence of child labor in Brazil, which are at stake but sparsely approached in literature.

In the first essay, we explored the cultural-historical concept of child labor in Brazil. Differently from the conventional wisdom, we observed that child labor in Brazil is not necessarily and generally conceive as a negative phenomenon to the development of children and adolescents. Traces of such mentality was found present in centuries of the Brazilian history and continues to influence contemporary decisions concerning child labor in the social and constitutional dimensions. Specifically, to certain extent, work in conceived to be positive in the sense that it dignifies, educate and protects children and adolescents. In light of such conception, we suggest that public policies to make greater effort in creating greater public awareness concerning the economic and health hazard of child labor. Such measure is prone to reduce child labor in cases in which children work not due to poverty but to cultural reasons. Moreover, such measure may serve as preventive measure to avoid the transmission of such concept of child labor to future generations.

In the second essay we investigated the determinants of child labor rate, however, paying special attention to the role of two governmental social programs – PBF cash transfer and Labor Inspection with focus on child labor. The hypotheses alleged was that both programs contribute to reduce the child labor rate in Brazil. On the one hand, we alleged this hypothesis concerning the *Bolsa Família* program because it relieves poor and extremely poor families of financial burdens and conditions beneficiary families to enroll children in school. On the other hand, the Labor Inspection is alleged to have mitigating effect on child labor because it assumes the role of withdrawing children from work so as to enroll them in school and give social assistance. Moreover, exploiters of child labor are fined and awareness is created in society concerning magnitude and consequences of early work of children and adolescents.

These hypothesis were tested using dynamic panel models, which were estimated using 2004–2009 and 2011–2014 PNAD data aggregated by state. In this essay, we did not find conclusive empirical evidence which permits to sustain the hypothesis that the PBF and Labor Inspection contributed to reduce child labor rate in Brazil.

However, through descriptive analysis, we found that approximately 62% of child laborers in 2004 were from families below the poverty line. Curiously, this proportion reduced expressively to 19% in 2014. These empirical and descriptive findings incite our first political suggestion that policies designed to combat child labor should not focus

exclusively on poor populations. This is exactly the case of the PBF program, which only attends populations below the poverty line.

Among all factors controlled in the empirical model of this second essay, only that for urbanization rate showed elastic relationship with child labor rate. This indicates that adoption of regional policies that promotes urbanization may cause highly responsive mitigating effect on child labor rate. Moreover, urbanization sprouts other social benefits as per access to better health, education and infrastructural facilities, which in turn bolster overall economic growth. Despite these enticing benefits, it is noteworthy that urbanization policies have to take into account adverse effects such as increase in crime, unemployment, migration, poor living conditions, etc. Inclusively, such conditions may end up wheeling child labor to invisible and worst forms such as prostitution, drug trafficking and street trading and services.

In the third essay, we investigated the intergenerational persistence of child labor, focusing on its *tipping point*. The hypothesis alleged concerning this objective is that families with child laborers are likely to be trapped in the vicious cycle of child labor, which can eventually be reverted. This hypothesis is founded on the argument that individuals who were child laborers accumulated less human capital through education and are likely to be less competitive in the labor market and are, thus, subjected to lower earning when adults. Consequently, such individuals are prone to remain in poverty and perpetuate child labor among subsequent generations of the same family. Therefore, on the contrary, if individuals defer their entry into the labor market and focus on accumulating minimum required human capital they stand greater chances of getting better paid jobs in the labor market and, therefore, break the child labor cycle.

We tested this hypothesis using pooled sample of 2004 to 2009 and 2011 to 2014 PNAD data to estimate probit models. Empirical results sustained the hypothesis of the existence of *child labor trap* and a tipping point was observed. Similarly to previous studies, we found that the risk of child labor in a given generation is negatively related to the age at which parents started working. However, this risk becomes minimum if individuals enter the labor market after the age of 27.

In Brazil, there is an intense political debate as to the minimum age for work, especially through Proposals of Constitution Amendment (PEC, in Brazilian acronym). In 2011, deputy Dilceu Sperafico presented PEC 18/2011 which suggested the reduction of this age from 16 to 14 based on the argument that such proposal will amplify the children's right in the sense that it formalizes the work of those who really need to work and guarantee them labor and security rights. In the same year, PEC 35/2011 was submitted by deputy Onofre Agostini supporting that work is beneficial to children and their families, especially, in the financial, moral and educational sense if these working children and adolescents are also enrolled in school and adequately followed-up. In 2013, PEC

274/2013 was forwarded by deputy Edinho Bez who, in line with the deputies mentioned earlier as per the minimum age for work, argued that work is educative for children and adolescents and also reminded that “an empty mind is a devil’s workshop”(Congresso em Foco, 21/06/2015)¹. In February of 2016, these PECs were recovered during debates in the National Congress and continued in discussion till October 4, 2016, with the final review of Deputy Betinho Gomes which deemed the PECs as unacceptable.

In accordance with this decision, results from the third essay firmly oppose these PECs and suggest that the minimum age for work should not be reduced from 16 to 14. In fact, we found that the risk of intergenerational persistence of child labor is lower if individuals enter the labor market at subsequent ages. Thus, the minimum age may be adjusted to coincide with the end of compulsory education (age of 17) and, thus, meet the specifications of the ILO Convention 138 concerning the compatibility of minimum age for work and compulsory education. Nevertheless, we acknowledge that increase in the minimum age may provoke adverse affect on families which solely depend on income from child labor. In such a case, we suggest a focal and generous assistance conditioned to child education.

Our results also corroborate literature concerning the capacity of large educational investment on a generation to revert poverty and child labor cycles in subsequent generations. However, in line with Basu (1999) we admit that such policy may be too fanciful, especially for developing countries.

Lastly, in the fourth essay, we investigated the relationship between child labor and the mental health of individuals. The hypothesis alleged was that individuals who venture into the labor market at early ages are more likely develop mental depression during adulthood. The reason for this is that individuals who venture into the labor market at early ages accumulate childhood stress due to early labor, which in most cases is conciliated with studies. Consequently, during adulthood such individuals may suffer psychological fatigue that, in turn, may sprout depressive symptoms.

This hypothesis was tested using 2008 PNAD data and its supplements to estimate probit models. The empirical evidence found sustains the alleged hypothesis of positive relationship between child labor and probability of mental depression. Specifically, individuals who started working at or before the age of 14 have higher probability of developing depressive symptoms compared to those who started at subsequent ages.

The mental health of individuals, especially children, continues to be an issue which has not gained due attention in Brazil alike in most developing countries. Moreover, the depression is, still, vastly attributed to biological or psychological and not socioeconomic factors. The first suggestion we offer, in line with WHO (2001) and The Economist (2014)

¹ The “Congresso em Foco”(Congress in focus, in English) is a journalistic site which covers facts and information, specifically, from the Brazilian National Congress.

is that mental disorders should not be faced exclusively as a biological or psychological problem, but also as a social problem. Only in this sense that it will be clear that child labor plays a determinant role on the risk of developing mental depression.

Again, emphasizing the political suggestion concerning minimum age for work, results uphold that the risk of mental depression reduces if individuals defer the age at which they enter the labor market. One major reason for this that most children, adolescent and youths who work end up also studying, and this may intensify their level of stress compared to adults who only work. During adulthood, these individuals who already internalized stress from early ages tend to be more prone to develop mental disorders. In the report of The Economist (2014), Patrick McGorry, Professor of the Centre for Youth Mental Health from the University of Melbourne, supported this argument concerning development challenges teenagers face in their transition to adulthood. Hence, if child labor is not adequately tackled nations might end up creating psychologically stressed individuals for the labor market and, thus, face high incidence of mental depression.

Furthermore, we suggest that basic mental health care should be provided for child laborers withdrawn from work. Particularly, those engaged in the worst forms such as, for example, agriculture, prostitution, drug trafficking and other activities that involve slavery and exposure to toxic substances. The reason for this is that, in such cases, mere conditional cash transfer programs may leave the psychological hazard of child labor unsolved.

Empirical results from the last essay also indicated that children from mentally depressed parents are more likely to develop depressive symptoms either through genetic or maternal bond. However, we are more convinced that the effect found is mainly attributed to family genetics because of the expressively lower effect found for the presence of other chronic physical illness in mothers. In this sense, we suggest that public health policies also pay attention to the offspring of individuals who are diagnosed of mental depression. This measure may help to anticipate and detect potential cases of depression at early stages. Furthermore, such potential cases may also be tackled by educating parents about how to detect and what activities may reduce the risk of developing depression. The reason for this measure is that most parents only detect or suspect mental depression in their offspring in its advanced stage.

In line with the above suggestion, we add that health specialists should provide, at least, basic education concerning mental depression to individuals who have chronic physical illness and also suggest therapeutic activities to the same. This is because, depending on the type of illness in question, individuals may become psychologically unbalanced when they overcontemplate their physical incapacities and/or internalize inferiority complex due to social discrimination.

Inasmuch as we acknowledge that the political suggestions offered here require

substantial government expenditure, we believe that such expenses will earn not only health and social benefits, but also economic benefits.

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