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Intergenerational persistence of child labor in Brazil

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Intergenerational Persistence of Child Labor in Brazil[☆]

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Abstract

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 an 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 study, 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 from 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.

Key words: child labor trap, *tipping point*, minimum age for work.

1. Introduction

There is a consensus in literature that poverty can perpetuate itself over family generations, especially, through education, igniting a poverty cycle. Having that poverty is a motivator of the supply of child labor, it likely that the cycles of both are also correlated. In order 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 and 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) 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 and Souza (2003) extended this

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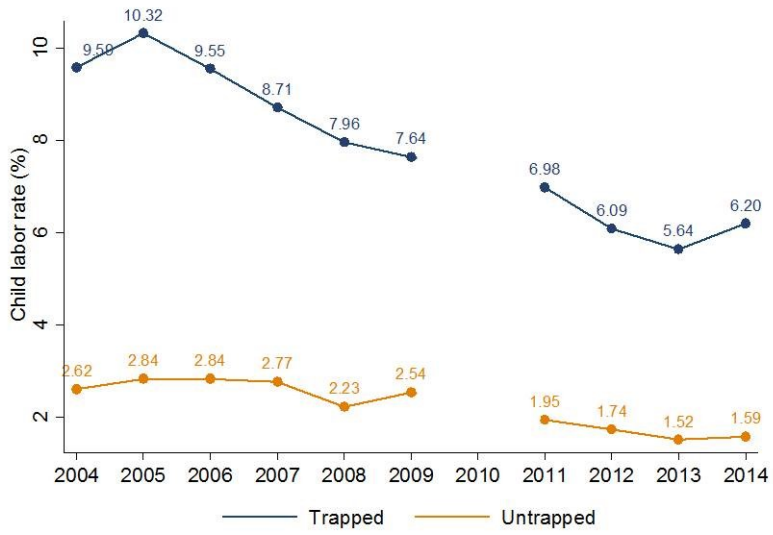

Figure 1: Percentage of trapped and untrapped children in the vicious cycle of child labor
Source: Prepared using 2004-2009 and 2011-2011 PNAD data.

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 a 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. 1, 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 from the continuous and systematic reduction of the proportion of trapped children, especially between the year 2005 and 2013, an abrupt increase was observed from the year 2004 to 2005 and from the 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 this socioeconomic betterment. Recalling Basu (1999) and Emerson and 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 fluctuations[3] were observed in subsequent years. Notwithstanding, a reduction was observed in 2011 compared to

[3]Remember that PNAD was not carried out in 2010.

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 and 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, we seek to enrich this topic in the following ways: a) analyze the existence of intergenerational persistence of child labor controlling time shocks between the 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 study, 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 the 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 study is divided into six sections, including this introductory one. In Section 2 and 3 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 presents the empirical strategy used and empirical results are provided in Section 5. Section 6 is conclusive.

2. 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 1985. In the author's 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 from 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 a parent and has a child. In this model, work and study (*proxy* for 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

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

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

$$\bar{V}L(1 - e_{t-1}) \equiv W_t \tag{2}$$

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

$$e_t \equiv e_t = e(W_t) \equiv e(\bar{V}L(1 - e_{t-1})) \equiv e_t = \Phi(e_{t-1}) \tag{3}$$

where Φ is upward sloping and bounded at $e(\bar{V}L(0)) = e(\bar{V})$. Similarly to the model presented by Basu and Van (1998), this dynamic model points out two stable equilibria and one unstable equilibrium. At one stable equilibrium point, the parent sends 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, this equilibrium point depicts the *child labor trap*. On the other way round, the child is sent to school at the other stable equilibrium point. 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 on poor families, Ranjan (2001) and Das and Deb (2006), based on theoretical frameworks concur that the incidence of child labor can be reduced by credit-related policies. However, Das and Deb (2006) emphasizes that such policies only have effect in the long run.

Emerson and 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 constraints and human capital accumulation, Emerson and Souza (2003) was able to illustrate how the trap may be generated.

An additional assumption was made that families with little education need children's contribution 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

$$U_t = U(c_t,\, h_{t+1}) \tag{4}$$

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 $W_t = w_c^a + w_t^c$, 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

$$h_{t+1} = f(e_t) \qquad \text{where } f(0) = 1,\ f(1) = \bar{h} > 1,\ \text{and } f'(e_t) \geq 0\ \forall\, e_t \in [0,1] \tag{5}$$

In this model, the challenge adults face is to

$$\max_{e_t} U(h_t + 1 - e_t,\, f(e_t)) \tag{6}$$

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 $\dot{\Phi}()$ 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 ($h_t = \bar{h}$).

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

3. 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 apart from through forgone education, *child labor trap* may be sustained through cultural and social norms such as filial obligations (López-Calva et al., 2002; Emerson and Souza, 2003).

Concerning empirical evidence of the intergenerational persistence of child labor, only two studies were found for Brazil, which are those of Emerson and Souza (2003) and Aquino et al. (2010). Aside from the theoretical framework presented in Section 2,

Emerson and 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 that it provides not only information concerning parents, but also that of grandparents in respect of the 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 the 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 a 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 a 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 and 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) concerning the cultural roots of child labor in Brazil.

Aquino et al. (2010) contributed to the study of Emerson and 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 an upgrade, these authors performed a 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. Apart from 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.

As a contribution to both empirical studies reviewed in this section, we provide 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. Methodology

4.1. 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 and 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. Apart from 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.

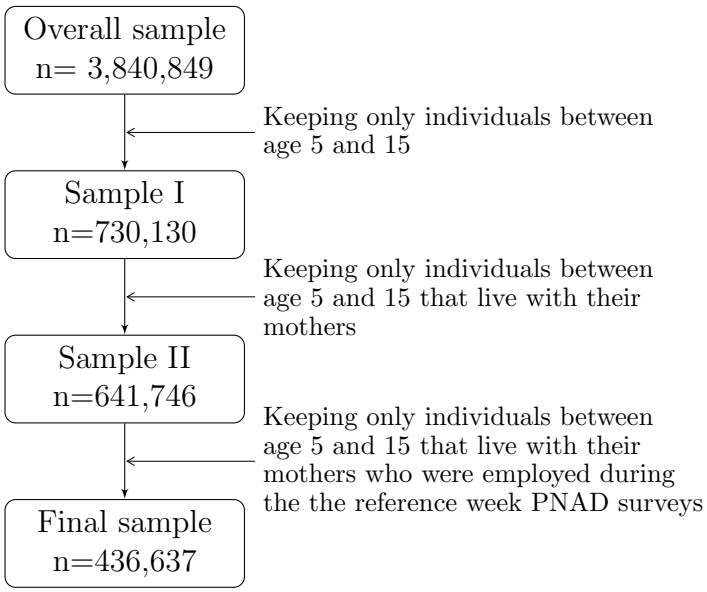

Figure 2: Filtration of pooled sample of PNAD data (2004 to 2009 and 2011 to 2014)
Source: Prepared by author.
Note: n denotes the number of observations.

We opted to filter the overall data to best fit the objectives of this study. 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. 2). As the major interest 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 a 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 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 1. 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 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.

4.2. Empirical Model

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

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 individual's mother started working (`CLmomage`) and its square; mother's age (`agemom`); mother's level of education measured in years of schooling (`mothereduc`); average per capita family income (`famincome`); family size (`familysize`); a dummy variable which is 1 if the individual is male and 0 otherwise (`male`); 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 race[4](`white` as base group, `asians`, `black` and `mulatto`)[5]; 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. Evidence from Emerson and Souza (2003) pointed that mother's level of education has a relatively higher impact on child labor decisions. Thus, we assume that conclusions drawn from mother's variables can serve as *proxy* for both parents.

5. 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.

The marginal effects observed from model I to V are presented in Table 2. These effects 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, categories of regressors were gradually incremented in the model in order to verify the stability of other estimates.

[4]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.

[5]Indigenous population was excluded due to the small number of observations.

Table 1: 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
	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.

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 with 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.

As per control variables, signs from `famincome`, `childeduc` and `urban` corroborate those from previous studies. Specifically, 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.

Moreover, 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 a 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 and Souza, 2003; ILO, 2007; Inaiá, 2008; Repórter Brasil, 2013; ILO, 2013, to mention few). The set of dummy variables for skin color indicates that the incidence of child labor is higher among the mulatto and black population compared to the white population.

The coefficient of the primary interest variable, `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 and 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, we acknowledge 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).

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 a 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

Table 2: 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`	0.0363***	0.0367***	0.0356***	0.0411***	0.0410***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	`childeduc`	−0.0354***	−0.0359***	−0.0233***	−0.0248***	−0.0250***
		(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
	`urban`	−0.0783***	−0.0756***	−0.0551***	−0.0701***	−0.0686***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	`asians`	−0.0120**	−0.00872	−0.00459	−0.00249	−0.00210
		(0.006)	(0.006)	(0.006)	(0.008)	(0.008)
	`mulatto`	0.0102***	0.00858***	0.00466***	0.00454***	0.00434***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	`black`	0.0118***	0.0102***	0.00326**	0.00347*	0.00397**
		(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Family's variables	`famincome`		0.000889***	0.00305***	0.00192***	0.00237***
			(0.000)	(0.000)	(0.001)	(0.001)
	`familysize`		0.00432***	0.00330***	0.00394***	0.00395***
			(0.000)	(0.000)	(0.000)	(0.000)
Mother's variables	`agemom`			0.00252***	0.00303***	0.00295***
				(0.000)	(0.000)	(0.000)
	`mothereduc`			−0.00274***	−0.00349***	−0.00340***
				(0.000)	(0.000)	(0.000)
	`CLmom`			0.0467***		
				(0.001)		
	`CLmombelow9`				0.0563***	
					(0.002)	
	`CLmom10-14`				0.0345***	
					(0.002)	
	`CLmom15-17`				0.0108***	
					(0.002)	
	`CLmom18-19`				−0.00590***	
					(0.002)	
	`CLmomage`					−0.0107***
						(0.000)
	`CLmomage squared`					0.000202***
						(0.000)
Time variables	`dummy for years`	yes	yes	yes	yes	yes
	`linear trend`	yes	yes	yes	yes	yes
Number of observations		436,637	432,586	432,586	432,586	432,586
pseudo R^2		0.094	0.095	0.156	0.155	0.156
Log likelihood		−72473004.3	−69762172.9	−56189902.0	−45534918.3	−45447071.3
LR χ^2(degree of freedom)		23493.1(15)	22949.3(17)	29977.3(20)	25252.8(23)	25787.4(21)

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

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 *tipping point* falls. Not surprisingly, the signs 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 reached at about the age of 26.5. Thus, this model shows that the probability of children to work is close to null if parents started working at the age of 26.5. Note that it is around this age at which a large number of Brazilian students complete their undergraduate studies.

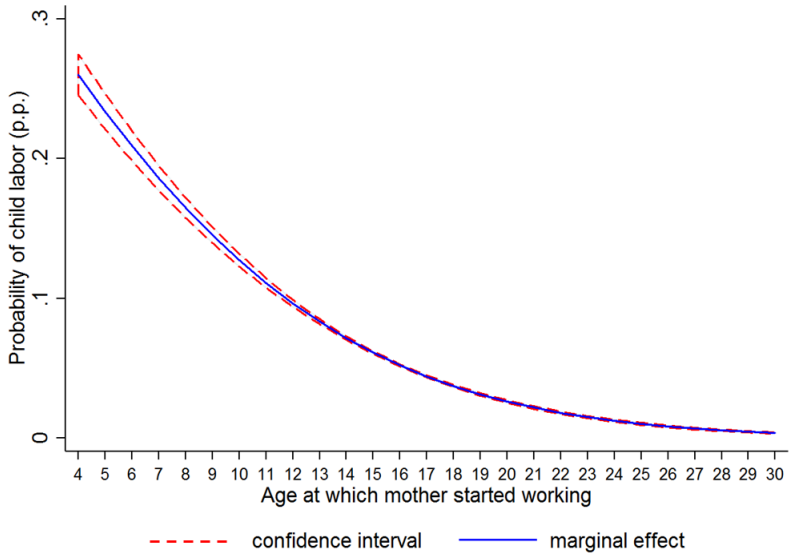

Figure 3: Marginal effect of the age at which mothers started working.
Source: Prepared using estimates from model I in Table 2.
Note: The continuous line is the estimated marginal effect and the broken lines represent confidence interval.

For the illustration of this result, Fig. 3 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 26.5. Thus, every additional year of postponement of entry into the labor market reduces the risk of child labor trap till its minimum. Aside from 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.

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 are 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 study 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.

6. Concluding Remarks

In this study, 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 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 a 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 26.

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 (2015)[6]. 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, empirical result from this study 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 the minimum age for work and compulsory education. Nevertheless, we acknowledge that increase in the minimum age may provoke adverse effect on families which solely

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

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.

Bibliography

Aquino, J. M., M. M. Fernandes, E. T. Pazello, L. G. Scorzafave, and Others (2010). Trabalho infantil: persistência intergeracional e decomposição da incidência entre 1992 e 2004 no brasil rural e urbano. *Revista de Economia Contemporânea 14*(1), 61–84.

Basu, K. (1999). Child labor: Cause, consequence, and cure, with remarks on international labor standards. *Journal of Economic Literature 37*(3), 1083–1119.

Basu, K. and P. H. Van (1998). The economics of child labor. *American Economic Review*, 412–427.

Cameron, A. C. and P. K. Trivedi (2010). *Microeconometrics using Stata*, Volume 2. Stata Press College Station, TX.

CONAETI, C. (2011). *Plano nacional de prevenção e erradicação do trabalho infantil e proteção adolescente trabalhador*. Brasília: Ministério do Trabalho e Emprego.

Congresso em Foco (21/06/2015). Deputados querem reduzir idade mńima para trabalho. `http://congressoemfoco.uol.com.br/`. Accessed on the 13th of May 2015.

Das, S. P. and R. Deb (2006). A dynamic analysis of child labor with a variable rate of discount: Some policy implications. *The B.E. Journal of Economic Analysis & Policy 5*(1), 1–30.

Emerson, P. M. and A. P. Souza (2003). Is there a child labor trap? intergenerational persistence of child labor in Brazil. *Economic Development and Cultural Change 51*(2), 375–398.

Guarcello, L., S. Lyon, F. C. Rosati, and C. Valdivia (2007). *Children's non-market activities and child labour measurement: A discussion based on household survey data*. Understanding Children's Work (UCW Programme).

ILO (2007). Explaining the demand and supply of child labour: A review of the underlying theories. Technical report, ILO/IPEC-SIMPOC.

ILO (2013). Marking progress against child labour: global estimates and trends 2000-2012. Technical report, International Labor Organization (ILO), IPEC (International Programme on the Elimination of Child Labor (IPEC).

Inaiá, M. M. C. (2008). O trabalho infantil no Brasil contemporâneo. *Caderno CRH 21*, 551–569.

Justus, M., H. Kawamura, and A. L. Kassouf (2015). What is the best age to enter the labor market in Brazil today? *EconomiA 16*(2), 235–249.

Justus, M., H. C. Kawamura, and A. L. Kassouf (2012). Socioeconomic conditions and risk of mental depression: an empirical analysis for Brazilian citizens. *Economics Research International 2012*, 1–20.

Kassouf, A. L. (2001). Trabalho infantil: escolaridade x emprego. *Economia 2*(2), 549–586.

Kassouf, A. L. (2015). Evolução do trabalho infantil no brasil. *Sinais Sociais 9*(27), 9–45.

López-Calva, L. F. et al. (2002). *Social norms, coordination, and policy issues in the fight against child labor*. Colegio de México.

Marin, J. O. B., S. Schneider, R. Vendruscolo, and C. B. d. C. Silva (2012). O problema do trabalho infantil na agricultura familiar: o caso da produção de tabaco em Agudo-RS. *Revista de Economia e Sociologia Rural 50*(4), 763 – 786.

Marshall, A. (1895). *Principles of economics*. Publisher: The English Langugage Book Society.

Ranjan, P. (2001). Credit constraints and the phenomenon of child labor. *Journal of Development Economics 64*(1), 81–102.

Repórter Brasil (2013). *Brasil livre de trabalho infantil: contribuições para o debate sobre a eliminação das piores formas do trabalho de crianças e adolescentes*. Repórter Brasil – Organização de comunicação e projetos sociais.