Socioeconomic aspects of child labor for the Brazilian children

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Abstract

The article's objective is to investigate the determinants that make boys and girls aged 5-14 years old have different probabilities of working in childhood from Brazil, using PNAD's data for the year of 2015. The econometric study sought to understand the Brazilian child labor, considering the gender of children aged between 5 and 14 years old, from the analysis of multiple variables, such as personal and familiar. The study used the Probit model, followed by the elaboration of the scenarios. A non-linear regression was used, made by the Fairlie decomposition method, its goal was to capture the dependent variable's differences (the productive characteristics of boys and girls), in function of the differences between the explanatory variables and the unobserved variables. The calculated coefficients were most of them significant and showed the expected signal. The results showed that age, location, and the likelihood that the reference person at home would have worked in childhood have a great relation with child work, as well as in the differential between the work of boys and girls.

Keywords: *child labor, Probit model, Fairlie decomposition*

Aspectos socioeconômicos do trabalho infantil para crianças brasileiras

Abstract

O objetivo desse artigo é investigar os determinantes que fazem, possivelmente, meninos e meninas, de 5 a 14 anos, terem probabilidades distintas de trabalharem na infância no Brasil, segundo dados da PNAD para o ano de 2015. A partir de análises econométricas de variáveis pessoais, familiares e domiciliares, buscou-se compreender a caracterização do trabalho infantil brasileiro, segundo o sexo das crianças com faixa etária de 5 a 14 anos. O modelo estimado foi o Probit, com a posterior elaboração de cenários. Ainda, foi utilizada a decomposição de Fairlie, para captar a diferença das variáveis dependentes das características produtivas de dois grupos (meninos e meninas), em função de discrepâncias sobre as variáveis explicativas e dos efeitos de variáveis não observadas. Os coeficientes obtidos apresentaram os sinais esperados, sendo em sua maioria, estatisticamente significativos. Os principais resultados apontam que idade, local onde a criança reside e a probabilidade de a pessoa de referência no domicílio ter trabalhado na infância, apresentam uma grande relação com o trabalho infantil, assim como no diferencial entre o trabalho de meninos e meninas.

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Palavras-chave: *trabalho infantil, modelo Probit, decomposição de Fairlie*

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Introduction

According to the Brazilian Constitution of 1988, article 7, item XXXIII, children under 14 years of age are prohibited from carrying out any type of work, except as an apprentice. Ten years later, in 1998, after the adoption of Constitutional Amendment 20, the work of children under the age of 16 was barred except as an apprentice from the age of 14,[i] as well as dangerous, unhealthy and night work up to 18 years.

Still, in Brazil, of the total of 60 million children and adolescents up to the age of 18,[ii] 2.7 million aged between 5 and 17 years worked in 2015, according to the National Household Sample Survey (PNAD/IBGE). The literature points out that the supply of child labor can be influenced according to family size and income or managerial risk, assuming that the children begin to perform some type of work to complement the family income - that is, they start to work because are poor (Ferro & Kassouf, 2005). However, Kassouf (1999) understands that child labor goes beyond family income. The characteristics of the children, the reference person at home, the composition and location of the family may be related to the insertion of children in labor activities (Kassouf, 2015).

Another variable to be considered in deciding the family in directing their children or not to work is the gender of the child. Kassouf (2002) argues that when families budget is limited, they must choose between educating their children or inserting them into work activities. Such choices may not consider children's qualifications or competencies but rather be based on the patriarchal family model, religious choices, and the traditional model of gender issues that tend to target girls to education and boys to work (Moreira et al., 2014).

Although the family often chooses to send boys to the labor market and educate girls, Vaz (1999) points out that poor young girls, around the age of seven, begin with family work, whether in the care of the younger siblings or helping with household chores, a practice that makes up the daily lives of the poor. It is worth noting that, according to PNAD data, household chores are an activity that is present in the lives of 83% of girls aged 10 to 16 years. The work of people under 16 is a practice that needs to be controlled so that the moral, social and psychological development of children and adolescents can be preserved. Moreover, the consequences associated with child labor can affect not only the children's childhood, but also their adult life – interfering negatively in the achievement of education and human capital (Santos, 2007).

Therefore, Sobreira et al. (2018) emphasizes the importance of analyzing other factors, besides income, that determine child labor, and can help public policies that focus on reducing child labor. The objective of this article is therefore to investigate the determinants that possibly make boys and girls between 5 and 14 years of age have different probabilities of working in childhood in Brazil, according to PNAD data for the year 2015. The model to be estimated in this study is the Probit, based on a cumulative normal distribution function. Additionally, through the Fairlie decomposition, we evaluated the main factors that explain the differential of work probability between boys and girls, due to discrepancies on the explanatory variables and the effects of variables not observed.

The article is divided as follows: in addition to this brief introduction, it consists of four more sections. Section 2 presents a review of the literature on child labor to obtain the main evidences of the work. Section 3 discusses the methodology used. The results are discussed in section 4. Finally, section 5 presents a synthesis that concludes this work.

Determinants of child labor: a brief review of literature

The various studies that address child labor have several variables that can explain it. Initially, income was considered the primary cause of the insertion of children into work activities (Basu & Tzannatos, 2003; Kassouf, 1999 and Brown, Deardorff & Stern, 2001).

For economic theory, the explanation is based basically on two axioms approached in the model proposed by Basu and Van (1998): well of luxury and well of substitution. The first is associated with the decision of the families to insert their children into the labor market. For the authors, the children are sent to the labor market only in the condition of poverty, that is, if child labor is necessary for the subsistence of the family. Thus, schooling and leisure would be luxury goods. To the extent that there is an increase in the income level of a family, consumption in education and leisure increases more than proportionally. The second axiom is related to the substitution of adult labor for child labor in some tasks. Thus, the adult and child labor are substitute from the point of view of the firm.

According to Jacoby and Skoufias (1997) it is believed that child labor is closely related to poverty. At the same time, poverty is highly related to economic shocks. In the case of developing countries, removing children from school and directing them to

work is one of the alternatives used by families to deal with such economic shocks and likely financial vulnerability of families. This inverse relationship between the income level of a family and the probability of insertion of the children in the labor market is well studied in Brazil (Araújo et al., 2010; Moreira et al., 2014; Mota, Jorge & Campos, 2016; Mesquita et al., 2017).

Despite this, per capita income was not significant in other studies. Barros, Mendonça and Velazco (2015) analyzing Brazil from 1960 to 1980, concluded that poverty is not the main factor in the occurrence of child labor and that cultural and family aspects should be considered in studies on the subject.

According to Ferreira-Batista and Cacciamali (2012), specialized works focus on the problem of family income and only the environment of poverty in which the child lives is considered. However, family income would be a variable-synthesis of several other economic-demographic characteristics, observable or not, such as parental schooling, color, family size, etc. Therefore, according to the authors, along with the monetary question, it is relevant to observe the family structure and the characteristics of the parents, since they are related to the family income, thus interfering with the probability of the children working (Ferreira-Batista & Cacciamali, 2012).

The literature points out that two basic aspects interfere in the supply of child labor: family size and income or managerial risk. The time of the child is divided between school, household chores and work-considering the size and structure of the family, the productivity of the parents and the child and the degree of substitution between them (Kassouf, 2002). Works as Hill and Duncan (1987), Grootaert and Patrinos (2002) and Chernozhukov, Fernández-Val and Kowalski (2015) indicate that there is a positive relationship between family size and the number of younger siblings and children entering the labor market.

In addition, Kassouf (2007) and Corseuil and Santos (2016) evidenced that the head of household's education is a variable negatively correlated with the chances of a child working. According to the authors, more educated parents seek better conditions for the future of their children, valuing more studies compared to work.

Other studies have explored the issue of child's gender in the probability of insertion in the labor market. Magalhães (2005) and Araújo et al. (2010) show that the chances of girls only studying are higher, since boys are more likely to only work or reconcile both work and study. According to FNPETI (2017), the highest proportion of children and adolescents employed in economic activities and in the most varied productive chains are boys (66.5%); black residents of urban areas; approximately 32% of children are included in agriculture. According to the FNPETI, this phenomenon shows the strong correlation with family income, race and gender, making certain groups of children more vulnerable to child labor.

However, the ILO (2002) draws attention to the number of girls in child labor situations which may be higher for two reasons: "girls may be more present in less visible forms of child labor and therefore less recorded by statistics), such as domestic work in private households" and "this dimension of child labor is not included in the world estimates. This is due to the lack of data and lack of consensus on what constitutes dangerous household chores for the purpose of measuring child labor" (Ibid., p.05).

In the literature, the child's age is considered a variable that positively affects the occurrence of child labor. Thus, as children become older the probability of being in the labor market increases (Magalhães, 2005; Moreira et al., 2014). The justification would be related to greater supply and work for older children, even so, children tend to gain experience with their age.

Some studies highlight the relation of child labor with the early entry of the reference person from the home into the labor market. Ramalho and Mesquita (2013) suggest that the immature entry into the labor market can negatively affect the accumulation of human capital, making it possible to lower the level of income in adulthood. Thus, parents with a low-income level tend to put their children to work, creating an intergenerational poverty cycle (Basu & Van, 1998; Basu & Tzannatos, 2003).

Still on the person of reference of the domicile, Manski et al. (1992) point out that the chances of children entering the labor market increase when the family is headed by the mother, as a consequence of a worse performance in the studies and, thus, greater school dropout. In this way, as the decision-makers decide between their children's work, study and leisure, there is a greater probability that children in female-headed families will be included in the labor market (Basu & Van, 1998).

Finally, the literature highlights that socioeconomic differences between Brazilian regions can influence child labor. Kassouf (2015) analyzed child labor, especially for hazardous occupations, and found that in the Nordeste's region the situation of children is the most unfavorable. Schwartzman and Schwartzman (2004) found that child labor predominates in the poorest and most agrarian regions of Brazil, such as the states of Bahia and Ceará.

Finally, Araújo et al. (2010), considering the Southeast region as a reference, shows that children in the Northeast and South regions have a better chance of just working That is, it can be inferred that the aggravating factor of child labor is more cultural than economic, especially in the poorer regions.

The studies discussed so far on the determinants of child labor highlight the need to evaluate how child exploitation in the different Brazilian states affects the life of children. In Brazil, there is a lack of studies that use probability models to analyze child labor according to gender. Therefore, research with this approach can favor and enrich the discussion about the formulation and improvements of public policies already existing in Brazil.

Methodology
Probit model

To evaluate the chances of a child working, the Probit model will be estimated based on a cumulative normal distribution function. The choice of the Probit model is due to the existence of more consistent and efficient estimation properties, such as the assurance that the probability of occurrence of an event is in a range between zero and one, as well as the non-linear relation between the explanatory variables and the estimated probability of the dependent variable (Wooldridge, 2010).

Initially, the marginal effects of the Probit model were used. In addition to using the influence of income on child labor, other personal variables were introduced in the analysis (gender, race), family (family size, spouse type), domiciliary, regional and census region (urban and rural). According to Kassouf (2007, 2015), OIT (2013), Jacoby and Skoufias (1997), Schwartzman and Schwartzman (2004), these variables are fundamental as determinants of child labor. Probit is a type of regression in which the dependent variable assumes values 1 or 0. In this case, the dependent variable assumes value 1 if the child works and 0, otherwise. The following equation (1) presents the estimated model:

$$Y_i = \beta_0 + \beta_1 gen_i + \beta_2 idade_i + \beta_3 cor_i + \beta_4 PR\_trabinf_i + \beta_5 mulher\_PR_i +$$
$$\beta_6 tam\_fam_i + \beta_7 fundamental_i + \beta_8 medio_i + \beta_9 superior_i + \beta_{10} RM_i +$$
$$\beta_{11} urbano_i + \beta_{12} w\_UF_i$$

(1)

The β_i (j = 1, 2, 3, ..., n) are the estimated parameters of the model. The variable Y_i is binary and assumes value 1 if the child works and 0, otherwise. The variable *gen*$_i$ refers to the gender dichotomous variable, which assumes value 1 for males and 0 for females. The variables age$_i$ and cor$_i$ correspond to the children's personal characteristics. The variable PR_trabin*f* refers to the reference person of the household having performed some work as a child. The variable mulher$_{PRi}$ refers to the situation of the domicile where the woman is the reference person. The variable tam_fam$_i$ corresponds to the size of the family in number of people of which the child is a part. The variables *fundamental*$_i$, *medio*$_i$ *e superior*$_i$ are dummies of schooling of the reference person in the household. The variable *RM*$_i$ is dichotomous and presents a value of 1 if the child resides in the metropolitan region and 0, otherwise. The variable urban$_i$ presents value 1 if the child resides in an urban area and 0 in a rural area. Finally, the variablew_{UFi} corresponds to the average income of R$1842.00 (BRL) of the unit of federation (state) in which the child - equivalent to the state of Santa Catarina (SC); which aims to capture the differences in economic activity in the different regions of the country.

However, the literature makes it clear that girls have different probabilities of boys working in infancy (Kassouf, 2007; OIT, 2013; OIT, 2018; Jacoby & Skoufias, 1997; Scwartzman & Scwartzman, 2004). Given this, it is interesting to evaluate the determinants of this differential. However, the Probit, because it is a non-linear model, it is not possible to use a linear decomposition, thus, Fairlie decomposition was chosen.

Fairlie[iii] decomposition

The most used technique for a standard linear regression is the Oaxaca-Blinder decomposition, developed by Blinder (1973) and Oaxaca (1973), in which it allows to recognize and quantify the separate contributions of differences between groups in estimable characteristics such as education, experience, marital status, etc. However, according to Carazza and Neto (2017), the procedure cannot be used directly if the result is a dummy and the coefficients are of a Logit or Probit model, but there is a way to perform the decomposition with estimates of these models.

According to Carazza and Neto (2017) the decomposition calculates the difference of the variables dependent on the productive characteristics of two groups, in the present work it is the group of boys and girls, due to discrepancies on the explanatory variables and the effects of variables not observed. From the original method of Fairlie (1999), the estimation of a decomposition for non-linear models is possible, as for example Y=F(X ´β ^), written as in (2):

$$\bar{Y}^m - \bar{Y}^f = \left[\sum_{i=1}^{N_m} \frac{F(X_i^m \hat{\beta}^m)}{N^m} - \sum_{i=1}^{N_f} \frac{F(X_i^f \hat{\beta}^m)}{N^f}\right] + \left[\sum_{i=1}^{N_f} \frac{F(X_i^f \hat{\beta}^m)}{N^f} - \sum_{i=1}^{N_m} \frac{F(X_i^f \hat{\beta}^f)}{N^f}\right]$$

(2)

Where ‾Y measures the average probability of male and female children, aged 5 to 14 years, accessing the labor market. The decomposition of the difference of this probability is determined by normal distributions described by the functions F(·). The sample size is represented by N^m and N^f. The characteristics of the children are represented, respectively, by X^m and X^f.

The first term in parentheses, on the right side of equality, represents the portion of the difference between the results that is due to the differences between the groups in the distribution of X and the second term in parentheses is the part that is responsible for the differences between groups no in the process that determines Y. Still on the second term, it also captures the model of equation (2) generates what is known, in the case of this work, as coefficients model for male children. Another equally valid expression is given by the following equation (3).

$$\bar{Y}^m - \bar{Y}^f = \left[\sum_{i=1}^{N_m} \frac{F(X_i^m \hat{\beta}^f)}{N^m} - \sum_{i=1}^{N_f} \frac{F(X_i^f \hat{\beta}^f)}{N^f}\right] + \left[\sum_{i=1}^{N_m} \frac{F(X_i^m \hat{\beta}^m)}{N^m} - \sum_{i=1}^{N_m} \frac{F(X_i^m \hat{\beta}^f)}{N^m}\right]$$

(3)

The equation above is known as the coefficients model for female children. Starting from the right side of equality, the first term in brackets uses as weights the estimated coefficients of the Probit model only with the sample of female children. On the other hand, the second term in brackets presents as weights the coefficients estimated by the Probit model with sample of male children.

From equations (2) and (3), the right side corresponds to the total differentiation of the boys and girls contribution, considering all the variables (observed or not) for the interference in the occurrence of child labor. Such individual contributions can be calculated while it is assumed that N^m N^f and that there is a relation of occurrence of child labor from one to one between boys and girls.

The results may be different as a result of the order of insertion of the variables being different. The control parameters in both parts of the equation are also changed. As for the sample size of the two analysis groups, they are rarely equal and a one to one combination becomes necessary, thus, "[...] separate contributions from independent variables or from the group of independent variables may be sensitive to ordering the variables" Carazza and Neto (2017). For this reason, random ordering is performed.

Presention of scenario

Eight scenarios were generated, besides a base scenario, changing only the variables that are significant. It is interesting to construct scenarios, since in estimating the likelihood of identical boys and girls it will be possible to indicate the main determinants of the probability differential, illustrating the Fairlie decomposition.

The base scenario refers to a self-declared white, 14-year-old male or female child whose household referral person did not work in childhood, with four persons in the household (including the child), where the highest educational level of the reference person in the household is the complete high school, living in an urban area of a metropolitan region, and residing in a Unit of Federation (state) with an average income of R$1842.00 (BRL) - equivalent to the state of Santa Catarina (SC). Estimates of the probability of working for boys and girls in the "Base Scenario" were accompanied by 90% confidence intervals (IC90%). This procedure makes it possible to evaluate if two estimates of probability are statistically different given the level of significance of 10%. A similar procedure was replicated for the other scenarios.

With the same characteristics as the base scenario, the other scenarios are constructed. Scenario 1 changes the maximum education of the reference person to high school. Scenario 2 changes the maximum education of the reference person to elementary education. Scenario 3 changes the woman as reference person at home. Scenario 4 changes the child's color to non-white (black, brown, and indigenous). Scenario 5 changes to rural area. Scenario 6 changes to referral person from home to have done some work as a child. Scenario 7 changes the average income to R$2,159.00 (BRL), which is the income of the state of São Paulo (SP). Finally, scenario 8 changes the average income to R$1,250 (BRL), which is the average income equivalent to that of the state of Piauí (PI). These units of federation (UF) were chosen to compare the highest national average income (SP) with the lowest (PI).

Discussion of results

Analysis of the chances of child labor occurring

Table 1 shows the result of the estimated model to explain the determinants of child labor in Brazil in the year 2015. In column (1) the model is presented based on the characteristics of the individuals. In column (2) we added to the model "variables referring to the locality and the region of the analyzed individuals and, finally, in column (3) is presented the complete model plus the proxy of economic activity. In general, when analyzing the point estimates, the signs and standard deviations of the three estimated models show that there were no significant changes as explanatory variables were added. This result is relevant because it indicates the robustness of the estimates.

Analyzing the complete model (3), it is possible to observe that male children tend to be more likely to be involved in child labor compared to female children. The same result is found in Kassouf (2002), Kassouf (2007) and Cacciamali and Tatei (2008), where in this last study the highest proportion of working boys are those residing in rural areas.

The variable "Child age" was significant at 1%, indicating that as the child gets older, the greater the chance that the child is working, due to a greater accumulation of experience and maturity (Kassouf, 2002; Kassouf, 2007; Kassouf & Santos, 2010). Following results found by Kassouf and Santos (2010), the color of the child was an argument that was not related to the probability of the child working. Cacciamali and Tatei (2008), in estimates made for children resident in the non-agricultural sector, also verify the absence of significance of the color variable.

Regarding the variable "PR child labor" - which represents whether the reference person at home did work as a child -, it had a positive and statistically significant effect at 1% in relation to the possibility of the child working. Ramalho and Mesquita (2013) suggest that early entry into the labor market can negatively affect the accumulation of human capital, making the level of income in adulthood lower. Thus, parents with a low-income level tend to put their children to work, creating a vicious intergenerational cycle of poverty (Basu & Van, 1998; Basu & Tzannatos, 2003).

The variable "Woman PR" is not statistically significant. In Schwartzman and Schwartzman (2004), the results conclude that there is no significant difference in the probability of occurrence of child labor because the child lives only with the mother or both parents. What tends to interfere with the children's work would be the economic activities of the parents: if the father and especially the mother work, children are more likely to work. Thus, child labor, according to the authors, would be an additional activity to the work of the parents than a compensation for their lack of work.

Table 1

Estimates of the Probit model for children from 5 to 14 years of age in Brazil -2015.

Variables	(1)	(2)	(3)
Child gender	0,3748088***	0,3808446***	0,3825412***
	(0,0294559)	(0,0303268)	(0,030427)
Child age	0,1764513***	0,1894265***	0,1905124***
	(0,0064944)	(0,0068328)	(0,0068608)
Child color	- 0,0635082**	- 0,0224462^{ns}	0,0098069^{ns}
	(0,0305972)	(0,0316349)	(0,0321601)
PR child labor	0,5287955***	0,4256744***	0,4271142***
	(0,0313946)	(0,0328343)	(0,0329795)
Woman PR	- 0,0624996**	0,0343841^{ns}	-0,0313062^{ns}
	(0,0309889)	(0,0324419)	(0,0325638)
Family size	0,0368856***	0,0186663*	0,0180073*
	(0,0093322)	(0,0096257)	(0,0096463)
Elementary education	-0,1954638***	-0,0581139^{ns}	-0,0437794^{ns}
	(0,0397196)	(0,0415632)	(0,041734)
High school	- 0,3454631***	- 0,1689865***	- 0,1571943***
	(0,0378256)	(0,315935)	(0,0402023)
Superior education	- 0,503024***	- 0,3161045***	- 0,3116851***
	(0,0768826)	(0,0798598)	(0,0801434)
Metropolitan Region		-0,2606945***	-0,230714***
		(0,0406138)	(0,0409799)
Urban		-0,5933227***	-0,5825403***
		(0,0327284)	(0,0328733)
State income (UF)			- 0,00002054***
			(0,00001315)
Pseudo R²	0,1763	0,2187	0,2220
X² Test	1899,85	2356,95	2392,48
Observations	53.186	53.186	53.186

Note. Standard errors in parentheses
***- significant at 1%; **- significant at 5%; *- significant at 10%; ns- not significant. Source: Own elaboration based on PNAD (2015).

The estimates obtained in relation to the variable "Family Size" indicate a positive and significant effect in relation to child labor, demonstrating that the greater the number of people in the family, the greater the probability of the children working. Kassouf (2007) discusses the effect of the variable family size, being positive and significant, in a result like the effect of number of younger siblings in the family.

The variables related to locality, "Metropolitan Region" and "Urban", had a negative and statistically significant effect to 1% in relation to child labor. This result indicates that children living in the interior or in rural areas are more likely to work, a result that is found in Kassouf and Santos (2010). This probability is related not only to income, but also to the structural determinants of rural and inland areas, which range from a poor school structure to a greater possibility of absorption of child labor in less qualified activities (Kassouf, 2007). Considering the variable "Income of the Unit of Federation (UF)", which is a proxy for the level of economic activity, it had a negative and statistically significant effect at 1%.

Now, based on the estimates of the complete model, a base scenario is defined, along with eight other scenarios, always compared to the base. The purpose of constructing these scenarios is to be able to analyze the probability of the representative individuals, male and female children, to be working. The scenarios are presented in Table 2, below:

Table 2
Probabilities of children working according to the model (3).

Scenarios	Child gender			
	Male		Female	
Base Scenario	2,96		1,16	
	[IC90%]		[IC90%]	
	2,26	3,64	0,83	1,48
Scenario 1 Superior Education	2,06		0,77	
	[IC90%]		[IC90%]	
	1,31	2,79	0,44	1,08
Scenario 2 Elementary Education	3,80		1,56	
	[IC90%]		[IC90%]	
	2,91	4,70	1,11	1,98
Scenario 3 Woman as P.R	2,75		1,07	
	[IC90%]		[IC90%]	
	2,08	3,41	0,76	1,37
Scenario 4 Non-white individual	2,89		1,13	
	[IC90%]		[IC90%]	
	2,26	3,52	0,83	1,42
Scenario 5 Rural area	9,60		4,57	
	[IC90%]		[IC90%]	
	7,53	11,65	3,39	5,76
Scenario 6 PR child labor	5,31		2,28	
	[IC90%]		[IC90%]	
	3,65	6,98	1,44	3,13
Scenario 7 Average income R $ 2,159.00	2,95		1,15	
	[IC90%]		[IC90%]	
	2,26	3,64	0,83	1,48
Scenario 8 Average income R $ 1,250.00	2,95		1,15	
	[IC90%]		[IC90%]	
	2,26	3,64	0,83	1,48

Note. The base scenario refers to a 14-year-old self-declared white male or female child whose household person of reference (PR) did not work in childhood, with four persons in the household (including the child), where the highest level of schooling of the person of reference of the household is the full high school education, living in an urban area of a metropolitan region, and residing in a Unit of Federation with an average income of R $ 1842.00 (BRL) -equivalent to the state of Santa Catarina (SC). Source: Own elaboration.

For the base scenario, considering the 90% confidence interval (IC90%), male children, on average, were more likely to be included in the work compared to female children, 2.96% and 1.16 %, respectively. Magalhães (2005) corroborates this result, indicating that girls are more likely to only study, in contrast, boys are more likely to only work or both, to study and to work. Nevertheless, factors related to tradition could interfere in the condition of inserting the children in the labor market, where the option would be to educate the girls and the boys would dedicate themselves to work (Moreira et al., 2014).

The difference between the base scenario and scenarios 1 and 2 consists of the schooling of the household reference person. In the base scenario, the person of reference has the highest level of education in high school, in scenario 1, the highest level of education becomes superior education and in scenario 2, it becomes the elementary education. The point statistics indicate that the higher the level of education of the reference person, the lower the probability of insertion of the child at work, still statistically at a level of significance of 10%, it is possible to state that, given the gender of the child , there is a difference in the probability of working when the reference person's schooling varies. Kassouf (2007), Corseuil and Santos (2016), highlight the influence of increased parental schooling in reducing the insertion of children involved in work activities.

Regarding scenario 3, where the woman is the reference person of the household and scenario 4 that considers non-white children (black, brown or indigenous), both statistically considering the 90% confidence interval (IC90%), the probability of the child working is different given the gender of the child in these circumstances. As addressed by Kassouf (2002), the mother's schooling has a direct effect on the insertion of children in work activities. Still, in an analysis for the rural sector, Cacciamali and Tatei (2008) found a positive relation between the child being white and living in the rural area, which indicates a lower probability of insertion in the work for non-white children.

Scenario 5, which considers the child residing in rural areas, presented the highest probability of child labor, for both genders. This shows that residing in rural areas has significantly increased the chances of a child working. Point statistics indicate that a male child residing in rural areas is 9.60% likely to work, while only 4.57% of girls would do some type of child labor. Also, considering a level of significance of 10%, the probability of a child being in the labor market, given the gender, is statistically different when she/he is a resident of the rural region.

In the literature, some studies are against these results. Kassouf (2007), Schwartzman and Schwartzman (2004) and Cacciamali and Tatei (2008) point out that in rural areas there is a large participation of children in work activities, especially in the case of boys.

Still, this probability is related not only to income, but also to structural determinants of the rural and interior areas, from a poor school structure to a greater possibility of absorption of child labor in activities that require little qualification (Kassouf, 2007). Finally, Mattos et al. (2006) emphasizes that children living in rural areas are more likely to engage in child labor, since these areas are more restricted to monitoring and present greater restrictions on the insertion of social policies.

Scenario 6 considers whether the household reference person worked as a child. After scenario 5, this scenario was the one that presented the highest probability of boys and girls performing some labor activity, of 5.31% and 2.28%, respectively. Statistically, the probability of working, according to gender, is different for children when the household reference person performed child labor as a child.

Emerson and Souza (2003) verified that this greater probability is related to an intergenerational dependence, entailed by a "more natural" vision of the parents in inserting their children into labor activities. It is important to emphasize that, despite this, they do not underestimate the importance of education in their children's lives, in relation to the acquisition of human capital and the desire for a better future (Moreira et al., 2014).

Regarding scenarios 7 and 8, it is considered a change in the average value of Unit of Federation (UF) income, a variable used as proxy for the level of economic activity. In the base scenario, the UF income used corresponded to the average income of the state of Santa Catarina, and in scenarios 7 and 8, the incomes corresponding to the state of São Paulo and the state of Piauí, respectively, were used.

Comparing the groups, boys and girls, at a significance level of 10%, there is statistically no difference in the probability of children working. The probabilities were the same for the scenarios, even changing the average income. The unintuitive results demonstrate the controversy of poverty as a determinant in studies for child labor (Kassouf, 2007).

In summary, when comparing groups of children according to gender, all scenarios present, at a significance level of 10%, a probability of performing some statistically different labor activity. This result corroborates studies such as Kassouf (2002), Cacciamali and Tatei (2008), Magalhães (2005) and Araújo et al. (2010).

Fairlie decomposition

Given the difference in probability of boys and girls participating in labor activities, presented in Table 1, it is fundamental to investigate further the factors that determine this differential. For this, a decomposition of the occurrence of child labor was applied to verify, through a qualitative analysis, the main factors that contribute to the greater proportion of boys doing child labor when compared to the girls.[iv] Table 3 shows the Fairlie decomposition for children in Brazil, considering the year 2015.

In columns (1) and (2), the estimates of the coefficients of differences in the probability of occurrence of work for boys and girls are performed. Column (3) presents the decomposition of the occurrence of child labor considering joint information (Pooled), according to gender. Finally, column (4) considers the joint decomposition, but the reverse order of the model variables is used, something that is recommended by Carazza (2012), as a way to verify if the decomposition does not lose the effect due to the change in the order of the variables.

Table 3

Fairlie decomposition for the probability of child labor of children, by gender.

	Male (1)	Female (2)	Pooled (3)	Reverse Order (4)
Child age	- 0.0108876*** (0.0005939)	- 0.0043959*** (0.0004536)	- 0.0079234*** (0.0003924)	0.0009174** (0.0003978)
Child color	- 0.0001079ns (0.0000728)	- 0.0001211* (0.0000672)	- 0.01236897ns (0.0000188)	- 0.01110481ns (0.0000516)
PR child labor	0.0020996*** (0.0002683)	0.0010442*** (0.0002049)	0.0016422*** (0.0001739)	- 0.00056*** (0.0002039)
Woman PR	- 0.0000954ns (0.0002369)	- 0.0001988ns (0.0001641)	- 0.0001508ns (0.0001545)	0.0000324ns (0.0000865)
Family size	- 0.0000877ns (0.0001327)	- 0.0001888ns (0.0001137)	- 0.0001253ns (0.0000879)	0.0000216ns (0.0000549)
Schooling PR	0.001018*** (0.0002807)	0.0003319* (0.0001953)	0.0006648*** (0.0001804)	- 0.0000635ns (0.0001159)
Metropolitan Region	0.0012767*** (0.0002728)	0.0003916** (0.0001964)	0.0008631*** (0.0001744)	- 0.0000192ns (0.0001209)
Urban	0.0051891*** (0.0004585)	0.0014596*** (0.0002877)	0.0034956*** (0.0002868)	- 0.0008499*** (0.0002946)
State income (UF)	0.0004539*** (0.0001309)	0.0009953*** (0.0001913)	0.0006405*** (0.000111)	-0.0001272ns (0.0001316)
Total Explained	- 0,00089776	- 0,00032144	- 0,00063585	- 0,00063585
	5,33%	1,91%	3,77%	3,77%
Difference Probability	- 0,01684977	- 0,01684977	- 0,01684977	- 0,01684977
Probability	0,02936855	0,01251878		

Note. ***- significant at 1%; **- significant at 5%; *- significant at 10%; ns- not significant. Source: Own elaboration based on PNAD (2015)

On average, the probability of child labor for male children was approximately 2.94% and for female children was about 1.25%. Thus, the value of the difference in probabilities was around 1.69%, indicating a higher percentage of chance of the boys working.

For the male children, the decomposition explained 5.33% and for the female children, the explanation was 1.91%. This differential can occur due to variables not observed, for example, Moreira et al. (2014) mentions religious choices, the patriarchal family model and the traditional model of gender issues that tend to educate girls and direct boys to the labor market. Still, Burra (1997) and Kassouf (2007) emphasize the lack of consideration of household chores, which is present in the lives of most poor girls (Vaz, 1999).

By analyzing individually the coefficients of the variables used in the decomposition of each of the groups, it is possible to observe that in the group of boys and in the group of girl, the variables that presented the greatest weight in the explanation of the differential of the child labor of boys and girls were "Urban", "PR (person of reference) child labor" and "Child age". Thus, the area of residence of the child (rural or urban) and the early entry of the person of reference into the labor market would have a positive effect on the discrepancy between child labor for boys and girls. However, the effect of age would be negative about the discrepancy in the probability of working between groups.

It is a consensus in some studies the greater chance of boys residing in rural areas to perform some type of work compared to girls in the same situation, without considering household chores – which is predominant for female children (Moreira et al., 2014; Kassouf, 2007; Schwartzman & Schwartzman, 2004 and Cacciamali & Tatei, 2008).

The variable household reference person that worked in childhood presents a positive relation with the chances of occurrence of child labor. Ramalho and Mesquita (2013) mention that early entry into the labor market can negatively affect the accumulation of human capital, making it possible to lower the level of income in adulthood. With this, parents with a low-income level tend to put their children to work, creating an intergenerational cycle of poverty (Basu & Van, 1998; Basu & Tzannatos, 2003).

In the literature, age is often positively related to child labor. Schwartzman and Schwartzman (2004) emphasize that regardless of gender, older children are more likely to work because of greater accumulation of experience and maturity (Kassouf, 2002; Kassouf, 2007; Kassouf & Santos, 2010).

Other variables such as "Schooling PR", "Metropolitan Region" and "State income (UF)" were significant at 1% and 5% in most of the estimates. Also exerting significant weight in groups of male and female children. The impact of these variables on the discrepancy between boys 'and girls' work was positive.

It is highlighted in Kassouf (2002) that the effect of parental schooling, especially the effect of parental schooling, would have different magnitudes in relation to boys and girls. This difference may be the factor responsible for the positive relationship between the level of education of the household reference person and the increase in the differential between the work of boys and girls.

Regarding the economic proxy used in the analysis, which consists of UF Income, Kassouf (2007) observes the controversy over this type of variable. Regarding this, in the analysis of the scenarios, Table 2, it is possible to observe that even considering a UF income higher or lower, there was no difference in relation to the base scenario, which corroborates the different effects generated by this variable.

The other variables "Family Size" and "Woman PR" were not significant, except for "Child Color", significant only 10% and only for the group of girls. In relation to these results, it is possible to emphasize that in the estimates of the complete model of Probit, presented in Table 1, such variables were not significant at 1% of significance. On the behavior of these variables, in Kassouf (2007) the possibility of non-significant behavior of family size is highlighted, especially when the siblings' birth order is not considered. For color of children, non-significance can also be observed in Cacciamali and Tatei (2008), in the case of children residing in the non-agricultural sector.

In case the woman is the reference person, the non-significant result was found in the estimates made in Schwartzman and Schwartzman (2004). Thus, child labor would be more of an additional activity to the work of the parents than a compensation for the lack of work of the parents.

Finally, the column Pooled brings the joint decomposition for boys and girls. The total explained was 3.77%. Again, "Urban", "PR child labor" and "Child age" were the variables that presented the greatest weight to explain the differential in the insertion of boys and girls in child labor. It is important to note that the Reverse Order model presented the same total explained of the access differential, indicating that the estimates were robust.

Final considerations

The objective of this article was to investigate the determinants of child labor in Brazil, according to PNAD data for the year 2015. For this, the sample was composed of children from 5 to 14 years of age, using the microdata of the National Household Sample Survey (PNAD) of 2015.

For the analysis, the Probit of qualitative analysis was estimated, based on an accumulated normal distribution function and the subsequent elaboration of scenarios. Also, using Fairlie decomposition, a regression was used for non-linear models to capture the difference of the variables dependent on the productive characteristics of two groups (boys and girls), due to discrepancies on the explanatory variables and the effects of unobserved variable. A differentiation is made between the two groups much because a tendency found in the literature arguing that boys and girls have different probabilities of working (Kassouf, 2007).

The estimates found were statistically significant in the majority, having presented the expected signs. The main results indicate that male children tend to be more likely to be involved in child labor as compared to female children. Considering different levels of schooling, race, head of family and income, in all scenarios analyzed, male children had bigger chances of working than female children. Table 3 shows the chance of a male child to work is 1.69% bigger.

Child labor is a practice affect the moral, social and psychological development of children, negatively affecting the accumulation of human capital in the economy. In addition the child labor can affect their adult life, verified that this probability is related to an intergenerational dependence (Emerson & Souza, 2003). The results are related with families'

socioeconomic vulnerability. The more vulnerable, more they are forced by circumstances to put their children into the labor market, and the choice is mainly to choose the male child to work. The choice is made by old patriarchal traditions, religious views and predefined gender roles (Moreira et al., 2014).

In addition, the fact that the household reference person worked during childhood increases the possibility that the children of the household work; as well as the largest family size and age. The place of residence of the child also exerted great importance for the results with children from rural areas having a greater chance of working. In addition, in relation to these variables, we can highlight the greater effect of variables related to age, child labor performed by the reference person and the area of residence, on the differential between boys and girls labor. The variable's importance on the children's chance to work show that this phenomenon goes much beyond income-explained only.

The difference between boys and girls' probabilities to work is more explained by variables related to age, child labor done by the head of the family and the child's place of residence. There's a decrease in the disparity of boys and girls' work on the extend which the ages from both groups increases, meanwhile, the kind of work and the place of residence tend to increase de disparity.

The age effect is explained by the fact that the chances of a child to work raises substantially with its age, and the chances do not depend of the gender. The variables representing child labor done by the head of the family and place of resident are highly associated with probability of child labor, and related with the family's poverty. Families, when forced to, tend to choose a male child to work. Child labor made by the head of the family and place of residence rise the tendency of male children to work, when compared to female children.

Thereby, male children have higher chances to work when compared to female children, the main variables explaining the discrepancy are: child labor made by the head of the family and place of residence. Although the results, must be cleared that female child work is many times underreported, because of the house character of girl's work (OIT, 2018).

In Brazil since the Constitution of 1988, there exists laws prohibited child labor, as article 7 item XXXIII (children under 14 years of age are prohibited of work). However, it is necessary to create public policies that create conditions for child labor to be discontinued, such as: improvements in education and generation of employment and income for families, to promote a quality childhood for all children. Identifying the variables related to child work is important for explain the vulnerability of these children, thus allowing the adoption of more effective public policies.

As a suggestion to future works is very important to discuss the effect of child work on the children's health and professional formation. Furthermore, the reasons companies have to hire children are a good point of analysis, as well to analyze exclusively the housekeeping work.

References

Araújo, A. A., Lima, J. E., Lima, J. R. F., & Gomes, M. F. M. (2010). Trabalho infantil no Brasil: análise dos principais determinantes. Ensaios FEE, 31(2), pp. 373–394. https://revistas.dee.spgg.rs.gov.br/index.php/ensaios/article/view/2374

Barros, R. P., Mendonça, R. S. P., & Velazco, T. (2015). Is poverty the main cause of child work in urban Brazil? (52). Discussion Paper. https://www.econstor.eu/bitstream/10419/220141/1/dp_052.pdf

Basu, K., & Tzannatos, Z. (2003). The Global Child Labor Problem: What Do We Know and What Can We Do? The World Bank Economic Review, 17(2), pp. 147–173. https://doi.org/10.1093/wber/lhg021.

Basu, K., & Van, P. H. (1998). The economics of child labor. American economic review, pp. 412-427. [Links]

Blinder, A. S. (1973). Wage discrimination: reduced form and structural estimates. Journal of Human Resources, pp. 436-455.

Brown, D. K., Deardorff, A. V. & Stern, R. M. (2001). Child labor: theory, evidence and policy. Research Seminar in International Economics Discussion Paper (474).

Burra, N. (1997). Born to work: Child labour in India. Oxford University Press, USA.

Cacciamali, M. C., & Tatei, F. (2008). Trabalho infantil e o status ocupacional dos pais. Revista de Economia Politica, 28(2), pp. 269–290. [Links]

Carazza, L. E. B. (2012). Renda, desigualdade regional e saúde infantil: um estudo empírico para as regiões metropolitanas brasileiras [Master's thesis, Universidade Federal de Pernambuco]. https://attena.ufpe.br/bitstream/123456789/10350/1/Dissertacao%20Final.pdf

Carazza, L. C. B., Neto, R. M. S. (2017). Renda e desigualdade regional na saúde infantil: um estudo empírico para as regiões metropolitanas brasileiras. Revista Econômica do Nordeste, 48(3), pp. 9-24.

Chernozhukov, V., Fernández-Val, I., & Kowalski, A. E. (2015). Quantile regression with censoring and endogeneity. Journal of Econometrics, 186(1), pp. 201-221. https://www.nber.org/papers/w16997.pdf

Corseuil, C. H., & Santos, D. D. (2016). Decisões críticas em idades críticas: a escolha dos jovens entre estudo e trabalho em seis países da América Latina. Anais. http://www.abep.org.br/publicacoes/index.php/anais/article/viewFile/1027/991

Emerson, P. M., & Souza, A. P. (2003). Is there a child labor trap? Intergenerational persistence of child labor in Brazil. Economic development and cultural change, 51(2), pp. 375-398. http://www.accessecon.com/pubs/VUECON/vu02-w14.pdf

Fairlie, R. W. (1999). The absence of the African-American owned business: An analysis of the dynamics of self-employment. Journal of Labor Economics, 17(1), pp. 80-108. [Links]

Ferreira-Batista, N., & Cacciamali, M. C. (2012). Migração familiar, trabalho infantil e ciclo intergeracional da pobreza no estado de São Paulo. Nova Economia, 22(3), pp. 515–554. https://doi.org/10.1590/S0103-63512012000300004

Ferro, A. R., & Kassouf, A. L. (2005). Avaliação Do Impacto Dos Programas Bolsa-Escola Sobre O Trabalho Infantil No Brasil. Pesquisa e Planejamento Econômico, 35(3), pp. 417–444.

Fórum Nacional de Prevenção e Erradicação do Trabalho Infantil (FNPETI) (2017). Trabalho infantile nos ODS.

Grootaert, C., & Patrinos, H. (2002, May). A four-country comparative study of child labor. Economics of Child Labor Conference, Oslo, Noruega. [Links]

Hill, M. S., & Duncan, G. J. (1987). Parental family income and the socioeconomic attainment of children. Social Science Research, 16(1), 39-73. [Links]

Instituto Brasileiro de Geografia e Estatística (IBGE) (2018). Pesquisa Nacional por Amostra de Domicílios: introdução. Rio de Janeiro.

International Labour Organization (ILO) (2002). Every child counts: new global estimates on child labour. Genebra: ILO, p. 51.

Jacoby, H. G., & Skoufias, E. (1997). Risk, financial markets, and human capital in a developing country. The Review of Economic Studies, 64(3), pp. 311-335.

Kassouf, A. L. (1999). Trabalho infantil no Brasil. [Tese de Livre Docência apresentada na Escola Superior de Agricultura Luiz de Queiroz da Universidade de São Paulo], Piracicaba.

Kassouf, A. L. (2002). Aspectos sócio-econômicos do trabalho infantil no Brasil. In Aspectos sócio-econômicos do trabalho infantil no Brasil. Secretaria dos Direitos Humanos.

Kassouf, A. L. (2007). O que conhecemos sobre o trabalho infantil?. Nova economia, 17(2), 323-350. [Links]

Kassouf, A. L., & Santos, M. J. D. (2010). Trabalho infantil no meio rural brasileiro: evidências sobre o" paradoxo da riqueza". Economia Aplicada, 14(3), pp. 339-353. [Links]

Kassouf, A. L. (2015). Evolução do trabalho infantil no Brasil. Sinais Sociais, 9(27), pp. 9-45. [Links]

Magalhães, M. (2005). O trabalho infantil – aplicação do modelo multinomial. Labor and Demography. EconWPA.

Manski, C. F., Sandefur, G. D., McLanahan, S., & Powers, D. (1992). Alternative estimates of the effect of family structure during adolescence on high school graduation. Journal of the American Statistical Association, 87(417), pp. 25-37.

Mattos, L. B., Muller, C. A. S., Lima, J. E., & Lírio, V. S. (2006). Efeitos do trabalho infantil sobre a educação na Região Nordeste do Brasil. Revista Econômica do Nordeste, 37(3), pp. 356-367.

Mesquita, S. P.; Silva, M. E. L; Souza, W. P. S. F.; Oliveira, V. R. (2017). Trabalho infantil e programas de transferência de renda: uma análise do impacto do Programa Bolsa Família. Encontro nacional de economia, 45., Anais, Brasília.

Moreira, G. C., Teixeira, E. C., Gomes, M. F. M., & Moreira, R. B. (2014). Determinantes do trabalho infantil na região Nordeste do Brasil, no ano de 2009. Revista Economia e Desenvolvimento, 13(2), pp. 258–272.

Mota, S. T., Jorge, M. A., & Campos, C. S. S. (2016). Uma análise dos determinantes do trabalho infantil no estado de Santa Catarina. Revista NECAT- Revista do Núcleo de Estudos de Economia Catarinense, 5(10), pp. 97-124. [Links]

Oaxaca, R. (1973). Male-female wage differentials in urban labor markets. International Economic Review, pp. 693-709.

Organização Internacional do Trabalho (OIT) (2013). Medir o progresso na luta contra o trabalho infantil: estimativas e tendências mundiais 2000-2012. [Links]

Organização Internacional do Trabalho (OIT) (2018). Piores formas de trabalho infantil. Brasília. [Links]

Ramalho, H. M. D. B., & Mesquita, S. P. D. (2013). Determinantes do trabalho infantil no Brasil urbano: uma análise por dados em painel 2001-2009. Economia Aplicada, 17(2), pp. 193-225. [Links]

Santos, F. C. (2007). A redução do trabalho infantil e o aumento da freqüência escolar na década de 90 no Brasil. [Doctoral dissertation, Universidade de São Paulo].

Schwartzman, S., Schwartzman, F. F. (2004). O Trabalho infantil no Brasil. Escritório da Organização Internacional do Trabalho no Brasil.

Sobreira, D. B., Sampaio Morais, G. A., Silva, A. F., & Costa, L. V. (2018).
Determinantes das escolhas de trabalho e estudo na população infantil em pernambuco. Revista Econômica do Nordeste, 49(1), pp.63-81.

Vaz, M. (1999). A menina ea casa: a identidade coletiva da menina empregada doméstica: análise sobre o trabalho infanto-juvenil feminino. Press Color.

Wooldridge, J. M. (2010). Econometric analysis of cross section and panel data. MIT Press.