

Working Children and Adolescents and the Vicious Circle of Poverty from the Perspective of Gunnar Myrdal's Theory of Circular Cumulative Causation: Analysis and Implementation of a Probit Model to Brazil

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Abstract—The objective of this paper is to study the work of children and adolescents and the vicious circle of poverty from the perspective of Gunnar Myrdal's Theory of Circular Cumulative Causation. The objective is to show that if a person starts working in the juvenile phase of life they will be classified as poor or extremely poor when they are adult, which can be observed in the case of Brazil, more specifically in the north and northeast. To do this, the methodology used was statistical and econometric analysis by applying a probit model. The main results show that: if people reside in the northeastern region of Brazil, and if they have a low educational level and if they start their professional life before the age 18, they will increase the likelihood that they will be poor or extremely poor. There is a consensus in the literature that one of the causes of the intergenerational transmission of poverty is related to child labor, this because when one starts their professional life while still in the toddler or adolescence stages of life, they end up sacrificing their studies. Because of their low level of education, children or adolescents are forced to perform low-paid functions and abandon school, becoming in the future, people who will be classified as poor or extremely poor. As a result of poverty, parents may be forced to send their children out to work when they are young, so that in the future they will also become poor adults, a process that is characterized as the "vicious circle of poverty."

Keywords—Children, adolescents, Gunnar Myrdal, poverty, vicious circle.

I. INTRODUCTION

FOR a long time, the theme of "poverty" and "child labor" has certain prominence in academic research. It is a problem that society has been fighting throughout the years without presenting any effective solution. There is consensus among many researchers is that child labor is a strong determinant of the intergenerational transmission of poverty from one individual to another, since early entry in the job market is due, in most cases, to the economic vulnerability of families. However, to be inserted early in the workforce,

children and adolescents may abandon their studies, and in the future, because of a lack of formal qualifications, will be required to perform low-paid functions, becoming poor adults, as were their families, in a circle of poverty that is rarely broken.

In an attempt to obtain evidence of the vicious circle of poverty in Brazil, from the early entry into the labor market, this study presents a theoretical and quantitative analysis in order to not only characterize the adult population today, who began his working life before 18 years of age, but also assess the likelihood of this population belonging to the poor or extremely poor classes. Furthermore, the objective is also to establish a relationship between the vicious circle of poverty with the Theory of Circular Cumulative Causation [1].

Myrdal, proposed a methodology to understand the existence of economic and social inequality between countries by finding that in an economic scenario composed of several variables, changes in these variables will cause all others to follow the same direction, whether it be a negative or positive change. This change will behave in a circular and cumulative mode, changing forever the old existing reality. To prove the circular and cumulative dependency in economic variables, our research shows that this theory can be seen when studying child labor and its relationship to poverty in Brazil. When analyzing the variables outlined by the theory of circular causation, it may be possible to see how the vicious circle process of poverty is visible in Brazil, where a poor adult, inserted at the labor market as child, will probably place their own child into the labor market at a young age to help supplement the family income. The result is the creation of a circular and cumulative harmful effect of poverty for the family and for the child. To understand this relationship between child labor and poverty, presented research sought by statistical analysis to characterize the adult population who began their working life before 18 years of age. To complement the statistical analysis, an econometric analysis by applying a probit model will also be carried out, which will be database Sample National Survey by Household (PNAD) of 2013. In this sense, it was decided to split the study into six sections, besides this introduction. Section II presents the theoretical framework in which it seeks to describe,

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succinctly, the Theory of Causation Circular Cumulative [1] and the Theory of Vicious Circle of Poverty. Section III exposes the methodology and data used for the specific purposes of the basis proposed in Section IV, which will present the statistical analysis and econometric obtained and finally this is followed by the concluding remarks in Section V.

II. THE RELATIONSHIP BETWEEN THE THEORY OF CIRCULAR CAUSATION CUMULATIVE AND THE VICIOUS CIRCLE OF POVERTY

In 1968, Gunnar Myrdal, published a study in which the author believes that the economic inequality between nations can be explained initially by how countries conducted their colonization process. In this sense, the countries of European settlement have become richer, while colonized countries by African people, like most people in Asia and Latin America, remained poor. As a result, what was observed was that the rich countries, called developed, showed steady increases in their growth rates due to increased investment in the industrial sector, while poor countries, said to be backward or underdeveloped due to low levels income, grew less because of much lower levels of investment compared to richer nations. As a result, it was found that over time, there was a significant increase in terms of economic inequalities between developed and underdeveloped countries.

Myrdal believes that the theory of international trade, the stable equilibrium notion to the allocation of economic factors can explain social reality; they are ineffective because according to the author, he never proposed to explain the reality of underdevelopment and development economics. In this context, Myrdal draws up an alternative theory to better express the reasons for the existence of inequality in the development process at the regional, national and global level. In the period following World War II, Myrdal proposed a theory called the "Principle of Causation Circular Accumulative Process" to explain the process of development in rich and poor countries and because this process differs so dramatically in certain regions [2]

Myrdal, to the issue of development, can be traced to the logic of a vicious circle; one example is Dr. C.E.A Winslow, which states that health and poverty form a vicious circle as follows: people are sick because they are poor; they became poorer because they were sick and sicker because they were poorer [1]. Clearly, this is a process in which a negative factor tends to become increasingly negative when it interacts with other variables that make up the system. This finding goes against the principle of the stable equilibrium concept proposed by classical tradition.

Starting from the idea of the vicious circle, the author draws up a detailed critique of the equilibrium theory of Stability. Myrdal's reality behaves differently, since according to him, the system does not move to a state of equilibrium, but rather moves away from this position. Thus, an initial change to try to shift the whole system in the same direction of this change can be positive or negative. Nevertheless, the author defends the idea that this process of change can be halted, directed, or

mitigated by changes of variables that are exogenous to the system, such as planned political interference.

To show the applicability of the principle of circular and cumulative causation, Myrdal presents a study on the problem of the black population in the United States. Initially, it portrays the reality of blacks in North American society, who even having experienced some improvement after events such as the national movement of 1870 and the Civil War, remained in an undesirable state. In preparing his studies, the analysis focused on two factors that are directly related; discrimination and the low standard of living of the black population. For the author, these factors are interrelated, such that the low standard of living of blacks is supported by the discrimination of whites, and the way of life of this segment of the population - poverty, ignorance, uncleanliness, undisciplined, criminality, among others, feeds the rancor and enmity of the white population.

Not to fall into theoretical contradiction, since the idea of stable balance between these two realities can occur, the author reinforces his position by saying that if one of the factors to move in either direction, the other would follow the direction of this change, resulting in a process of accumulative mutual causation. For the author, such that the circular causation process is a good way to understand social interactions, the question that he intends to analyze is the scientific problem of this principle. Because the reality is very complex, not being subject to abstractions and simplifications, the idea that the factors that make up the system's power game must be analyzed and quantified in order to measure the ability of each to modify the other elements and the system itself, as well as the ability to be modified by external forces to work [2].

Myrdal points out that the more the interrelated factors of the system are studied and deciphered and the more factors are at hand to change through external factors, the greater the chances of success in the direction of maximizing political efforts to end the social improvements. In Brazil, several researchers have also reached the same conclusions in relation to child labor. According to these scholars, child labor is a strong determinant of the intergenerational transmission of poverty from one individual, since early entry into the job market is due, in most cases, to the economic vulnerability of families. However, to be inserted early in the workforce, children and adolescents may abandon their studies, and in the future, because of a lack of qualifications, will be expected to perform low-paid functions, becoming poor adults, as were their families, in a circle poverty that is hardly broken [3], [4].

In the last three decades, particularly in the 1990s, Brazil began a seminal effort to combat child labor by building a new institutional framework to address the issue. An example is the drafting of the 1988 Constitution, the adoption of the UN Convention on the Rights of the Child in 1989, the approval of Law 8.069 / 90 that created the Statute of Children and Adolescents (ECA) and also the adoption of Conventions No. 138 and 182 of the International Eradication of Child Labour Programme (IPEC) of the International Labour Organization (ILO) [5]-[7].

The measures adopted have generated joint efforts previously nonexistent or insignificant between the state and civil society, and from then materialized significant progress with regard to combating child labor [8], [7]. Although it has recorded a significant drop, the end of the existence of child and adolescent labor will not occur [8]. Child labor is seen as economic activities carried out by children or adolescents and performed with some regularity [8], [5].

The definition of a child varies from one nation to another. In some countries the definition of a child takes into account chronological criteria, while in others, the definition is related to social and cultural issues [3]. The ILO defines a child as a person up to 15 years of age; while the ECA defines children as individuals up to 12 years and adolescents as those between 12 and 18, as previously mentioned [9].

The emphasis on the issue child labor must seek refuge in the idea that this kind of activity is causes damage, mostly irreversible, to the child through to the teen years, but not only at this stage of life, but also into adulthood [7], [10], [9]. In one of his reports, the author said that the use of child labor is usually manifested by family vulnerability, illustrated by, especially income and parental education. This, combined with a socioeconomic structure, determines a vicious cycle of poverty that link the misery with child labor. Child Labor and low education promotes inequality and social exclusion.

There are many consequences of poverty for the individual and for society, but, according to a report prepared by the ILO, an important relationship can be established between poverty, child labor and education [8]. According to the report, poverty is the reason for the early inclusion of children in the workforce, and this adversely affects the qualification of human capital. The result will be a less skilled professional who will be forced to perform low-paid functions in the future, which will affect the income of the family [11].

Of all the negative effects of child labor that you can name, it is the lack of education that causes the greatest damage, as emphasized in other parts of the research, since "work has a detrimental effect on children's education and adolescent development" [7]. The first manifestation occurs when the child exerts some labor activity in this phase of life, as this tends to derail his school attendance; to work and study at the same time hinders the learning process [7], [10]. This fact is corroborated by research [12] to show the existence of a close correlation between child labor and school attendance.

According to [13], some activities performed by children are not in accordance with the laws and make them stop going to school- causing a perverse perspective for their future. The effect for the child is the limitation of employment opportunity: they will get a job that not require qualification and receive a low salary, keeping the children in a repetitive cycle of poverty like their parents [3]. The perverse perspective in the future referred to is related to the low pay that the child or adolescent is likely to receive. According to [6], a study by the World Bank revealed that early entry into the labor market reduces incomes on average by 13% to 20% [13], [14]. In one of his reports [8], states that the use of child labor usually illustrates the vulnerability of the family, which

is a consequence of income, parental education, combined with the determining socio-economic structure. From these analyzes can be seen that poverty and the child labor generates a perpetuation of itself cycle, it can affect professional qualifications, their physical and psychological health and the income of those entering the labor market as a child or adolescent. This fact has shown that the sooner a person starts working, the worse their health in adulthood [3], [14].

III. METHODOLOGY

Although poverty is recognized as one of several shortcomings syndrome, in Brazil, one of the main criteria used in the poverty-line definition states that an individual is considered poor or extremely poor, if they have a monthly income from all jobs equal to or less than half the minimum salary. This definition of poverty is widely used as eligibility criteria for government programs for the vulnerable population [16]. In this study, poverty is associated only with the occurrence of low-income, more specifically, with levels of per capita income considered insufficient to meet basic needs.

A Probit model was used to check the likelihood of a worker who started his professional life before the age of 17, to be considered to be poor or extremely poor. This model is commonly used to estimate a qualitative dependent variable [16]. Thus, whereas y is the dependent variable, the said probability can be represented as:

Probability (y_i / x_i) = 1, if the income received is $\leq \frac{1}{2}$ minimum wage;

Probability (y_i / x_i) = 0 if the received income is $> \frac{1}{2}$ minimum wage.

In this sense: $y = F(xy, d, bd, dc, dr, df, dz)$, where: $x \Rightarrow$ is a continuous variable representing the number of years of study; $ds \Rightarrow$ is a dummy variable that is sex; $di \Rightarrow$ is the vector of continuous variable representing age; $dc \Rightarrow$ is the vector of the dummy variable representing whether the person is of color or white or non-white race; $dr \Rightarrow$ is the vector of the dummy variable representing the region of residence; $df = i \Rightarrow$ is the vector of the dummy variable representing the condition in the labor market - formal or informal $dz \Rightarrow$ is the vector of the dummy variable that represents the area of residence - urban or rural.

The selected database was the National Sample Survey (PNAD), conducted by the Brazilian Institute of Geography and Statistics [17]. This household survey system was deployed from 1967 and aims to produce basic information, enabling a study of the socioeconomic development of Brazil. The program used to make the database selection and statistical and econometric analysis was Stata 10 software.

IV. RESULTS AND DISCUSSIONS

In this section, we will make the statistical and econometric analysis showing a person can be poor as an adult if they start their working life before 18 years of age. According to PNAD/IBGE 2013, Brazil has a population of 201,467,084, of which, 27.55% or 55,512,835 corresponds to the population

17 years of age or under. Moreover, it notes that Brazil has a significant population over the age of 18 years, representing 72.44% of the total population of the country, that is, a predominantly adult population.

Of the total Brazilian population, 142,843,051 correspond to people aged 18 years to 80 years. Of this total, 89,465,608 are productive people, i.e. those who are performing professional activities in the labor market. It is noteworthy that this population will be the focus of this study. Note that, 9.23% of the employed population began their working life before the age of nine years. Some 33.94% have played roles in the labor market between the ages 10 years to 14 years, and 28.84% when they were between 15 years and 17 years of age. This means that the productive population of 89,465,608 people, or 72.01%, started working before the age of 18, with only 27.98% starting work after 18 years of age.

Analyzing the ratio of the employed population in Brazil, with the years of study and the age at which they started work, it is clear that the vast majority of the population who started their working life aged less than nine years, 18.34%, have no formal education and that 38.29% had only one to five years of study. Of those who started work aged 10 years to 14 years, 9.90% have no education, while 27.68% have one to five years of study. These results reinforce what many researchers have emphasized, namely, that when a person starts his working life too early, it greatly increases the possibility of abandoning their education [3], [7].

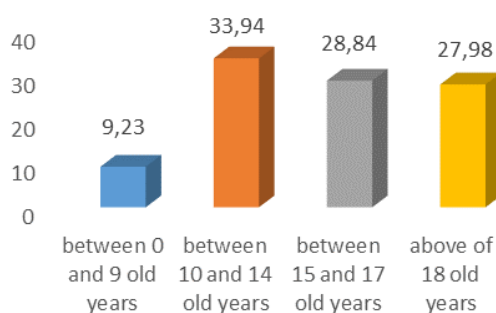


Fig. 1 Employed population of Brazil, according to the age at which started to work

Another important finding relates to income received in the labor market according to the age at which an individual started to work. It was observed that for the most individuals who started work before nine years: 10.10% do not receive any income and 21.47% receive half to 1.0 minimum wage. This allowed us observe that the earlier children and adolescents begin working activities, the lower their chances of securing a good salary as an adult. Among those who started between 10 years and 14 years of age, 6.07% do not receive any income, however, in this age group, an increase in the percentage of adults earning above the 1.0 minimum wage can be seen. Considerable improvement in terms of the income received can be observed in adults who started work aged 15 years to 17 years, this because when people start their working when they are older, they have more time to devote to

studies. Fig. 2 shows an important contribution of this study, presenting the relationship between the age at which the population joins the workforce and their situation in life as an adult. Among all age groups, it is worth highlighting the position of those who started working under the age of nine years. Of this group, 16.37% are considered to live in extreme poverty and 8.0% are classified as poor. Among those workers who began their working life aged 10 years to 14 years, 9.80% and 5.71% are classified as extremely poor and poor, respectively. When observing those who started work aged between 15 years and 17 years, it is noted that the percentage of extreme poverty and poverty falls to 3.4% and 3.10%, respectively. Again, it draws the attention of the reader to the pyramids. These make it evident that the probability of a person belonging to the class of extreme poverty and poverty is reduced significantly, the later a person joins the workforce.

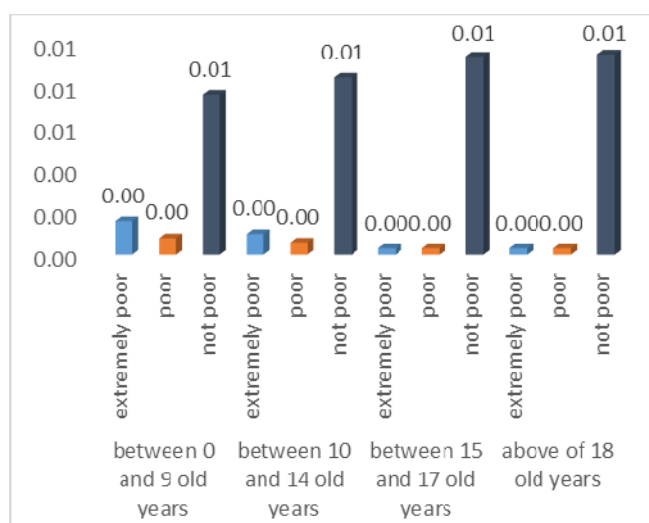


Fig. 2 Total employed population of Brazil in the classification in relation state of poverty: poor, extremely poor and not poor

These results are indicative that if these people started work early to contribute to the increase in family income, they become poor or extremely poor adults. Following, presented in Table I, are the results of the marginal effects of the probit regressions for the probability of the impact of child labor in adulthood.

In probit models, where Y is dichotomous, our interest is to know the likelihood of a person that have from 18 years to 80 years and began their working life before 18 years of age, to be poor or extremely poor. The variable that indicates this condition of life is personal income, so $Y = 1$ if income received, effective in 2013, is \leq half minimum wage, then the person will be considered as poor or extremely poor, $Y = 0$ if income received is $>$ half minimum wage, shall not be considered poor [15]. The marginal effects correspond to changes in the estimated probability given a 1% change in the explanatory variable.

It is seen in Table I, age reduces the likelihood of people being poor or extremely poor; this is because the older a person is, the less likely they are to belong to the poor or

extremely poor class. This result indicates that one year more in age, reduces by 0.6% the likelihood of that person being poor or extremely poor. However, a person of advanced age tends to increase their chance of being poor or extremely poor by 0.07%. This is due to the fact that the aged population tends to be less productive because of the problems inherent with the later phase of life.

According to the estimated parameters of the variable years of study, it can be inferred that the more study time a person has, the greater their chance of not being poor or extremely poor. That is, the probability of not being poor decreases by 3.10% for each year of study that a person completes.

The marginal effect of the sex ratio shows that the likelihood of being among the poor and extremely poor is lower for men than for women.

With regard to working conditions, there is the negative sign of the estimated coefficient that individuals who perform their functions in the formal labor market are less likely to become poor or extremely poor compared to those working informally.

In the aspect of color or race, the marginal effect showed negative, suggesting that people of color and whites are less likely to be poor or extremely poor compared to the non-white population.

extremely poor increases if they reside in the Northeast of Brazil compared to all other regions.

Since the initial proposal of this research was to determine any causal link between child labor and poverty, indicating the possibility of a vicious cycle, is presented in the end, the analysis of the econometric model on the variable "age". At what age people began to "work" and if that age has influence on that individual's likelihood of being poor or extremely poor. It may be noted that the sign of the estimated coefficients of the following: started working aged "zero to nine" years, "10 to 14" years and "15 to 17" years were all positive, indicating that joining the workforce before 18 years of age, increases the likelihood of a person - in adulthood - being poor or extremely poor, compared to a person starting work after 18 years of age. These results allow us to infer that, in fact, joining the workforce as a child or adolescent, can feed the vicious circle of poverty. These results reinforce what many studies have pointed out that, the earlier an individual enters into the labor market, the lower their chances of securing a good level of income in the future [3], [18], [7]. Moreover, the working child or adolescent, as an adult, due to their poor financial condition, has a higher likelihood of allowing their children to work in order to contribute to increasing the family income [3], [13], [4].

TABLE I

MARGINAL EFFECTS OF THE PROBIT REGRESSIONS FOR THE PROBABILITY OF THE IMPACT OF CHILD LABOR IN ADULTHOOD THE PERSON: AN ANALYSIS OF THE VICIOUS CIRCLE OF POVERTY - PNAD 2013

Variables	Marginal effect	Test z
Age	-0,0060	-57,72*
Age ²	0,0007	54,05*
Years of study	-0,0310	-47,14*
Sex (male = 1)	-0,5770	-70,20*
Labor market conditions (Formal = 1)	-0,1486	-74,88*
Color or race (white = 1)	-0,0048	-7,06*
Area (urban = 1)	-0,0766	-64,60*
Region (Northeast was omitted)		
North	-0,0155	-26,57*
Southeast	-0,0363	-46,34*
South	-0,0203	-28,35*
Midwest	-0,0228	-36,40*
Age you started working (> 18 years, has been omitted)		
9 years old	0,0358	21,24*
10 to 14 years	0,0207	19,41*
15 to 17 years	0,0052	4,88*
Number of observations:172.330		
Likelihood ratio test:-37521,63		
Chi ² Test 20017,19		
Prob> Chi ² 0,0000		
Pseudo R ² 0,4744		

Note: * denotes significance at the level of 1%.

The variable area of residence showed a negative signal, which shows that residents of the urban area have less probability to be in the condition of poverty or extreme poverty compared to those who live in the countryside. In regard to the variable associated with region, the results showed that the probability of a person being poor or

V. FINAL CONSIDERATIONS

In order to contribute to the subject of child labor and its possible consequences in adulthood, this study aimed, through statistical and econometric analysis, to analyze the effects of the early integration of children and adolescents into the workforce on their living conditions in adulthood; seeking to present evidence of the intergenerational transmission of poverty. Moreover, we also sought to verify the relationship of the Poverty Vicious Circle with the Theory of Causation Circular Cumulative [1].

In this study, the results for Brazil in 2013, left evident that individuals who start their working life in the child or adolescent period of life, ie, before the age of 18 years, show a significant percentage belonging to the poor or extremely poor population. Thus, these results allow us to infer that starting professional life before the appropriate time, interrupting the physical, psychological and emotional development, which occurs in childhood and adolescence, can lead to the existence of a vicious circle of poverty.

According to the research done throughout this work, it was found that in Brazil, when analyzing the relationship between child labor and poverty, one sees a significant similarity between these variables with a circular theory of causation cumulative effect [1]. The causal relationship between the two variables is configured as a circular process of cumulative effect. From the studies, which has been found is that the vulnerable financial situation of the family is the factor that exerts more influence to the inclusion of children and adolescents in work activities, aimed at complementing the family income.

The damage to children who entered the labor market early are numerous, among them is their stunted physical,

psychological and emotional development, the possible consequences of injury or illness resulting from accidents at work, among other reasons. However, the most significant damage can be seen in the future of this child or adolescent when they reach adulthood. The tendency is to grow to become adults without the necessary educational and professional qualifications demanded by the job market, and in most cases, they perform low-paid functions which will mean that these individuals will remain poor, replicating what their parents did and put their children to work when young (child or teen). From an analysis of the data obtained from the National Survey of Households (PNAD) of 2013, it was found that children and adolescents, who entered the labor market before the age of 18-year, were more likely to be poor or extremely poor when compared with those who started working after the age of 18 years. This finding was supported by several other studies that indicate that child labor has harmful effects on the child, especially with regard to their education and for their professional future as an adult [12], [6], [9].

It is noteworthy that the age, gender, market condition, and region also have an influence on the likelihood of being poor or extremely poor. Thus, young people who enter the labor market later are less likely to become a poor or extremely poor adult. Similarly, it was found that men, and those working in the formal market, have a lower likelihood of belonging to this class than women and informal workers. On the aspect of years of study, the research showed that educational level is also one of the poverty causation factors for the child and is intrinsically related to the vicious cycle of poverty.

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