

The Human Capital Vicious Cycle Created by the Child Labor Issue in Turkey

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Abstract: Child labor is one of the socio-economic problems of developing countries. The child labor phenomenon in Turkey is investigated in family structure with regard to human capital approach in this study. The existence of child labor results in either human development or poverty is aimed to show. In this study, starting with a production function the output per capita is reduced to representation of human capital and factor endowment and it is aimed to measure the human capital accumulation of individuals who have a relationship with child labor. According to the findings child labor causes a reduction of human capital accumulation both in the rural and urban areas of Turkey. It can be concluded that instead of falling in vicious cycle of poverty, the human development can be achieved through the increase in the human capital through developing the education and income levels of household decision makers.

Key words: child labor; human capital; poverty; education; development

JEL codes: A20, D10, H31

1. Introduction

The issue of child labor is a fundamental problem observed in developing countries. The existence of such an issue can lead to losses in human capital in the country. In this study, the aim is to present the effects of child labor on human capital. As in developing countries, the main factor behind the existence of child labor in Turkey is the poverty in the country, and more fundamentally, the poverty of the households. The viewing of the problem of child labor, which starts with poverty and continues by causing losses to human capital, as a problem, analyzing it in terms of the impact it creates in Turkey, and where necessary the ability to take measures to eliminate the problem are matters which are extremely important.

In this study it is accepted that child labor is determined by the underlying factors of poverty within and outside of the family, which cause child labor to occur, and which are referred to in the literature as the supply of child labor¹. These factors can be referred to as inherent factors. Thought to come about as a result of internal

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¹ The matters which determine child labor are defined using factors such as the following, which are shown as the supply of child

factors in theory, child labor comes up in consequence of implementation of the decisions of household in practice. From this point of view, having assumed the decisions of household heads as a reference, this study has been built by an economic frame having empirical testability.

It can be seen that there is a problem of a choice between the accumulation of human capital and an inclination to child labor. In order for politicians to be able to take effective measures to address these types of problems, it is necessary for them to be informed through analyses which possess concrete findings. The fact that this study views child labor and the accumulation of human capital as an issue of choice raises the requirement of obtaining the relevant data on the education and income of those making the decisions on child labor, which will facilitate the measuring of human capital from child labor. The data related with the study has been obtained by questioning the Survey of Working Children executed by Turkstat (Turkish Statistical Institute) in 2006. In light of this information, the statement of “If there weren’t any child labor in Turkey which is caused by poverty and come up as a result of the decisions of household, the accumulation of current human capital would be much more than it is now”, has been questioned within the assumption that simplifies the theoretical model in the separation of rural and urban.

The accumulation of human capital of household heads is calculated through a production function based approach from two main columns in the study. In the first column are the household heads whose child has been employed in the labor force; as to the second are the household heads that send their child only to school. Should the vicious circle of poverty mentioned in the model of the study be proven working after separately comparing these two columns in rural and urban Turkey, the hypothesis built above is going to be verified and it will be revealed that the orientation of child labor is not a step towards a humane development through concrete findings.

The reason for such a comparison is the opinion that the heads of the households are the people who make the decision to determine whether their children will work or not. The question frequently emphasized in the economic literature (see ... Basu, 1999) as to who makes the decision for children to work, is also one of the reference points of this study. In this study, it is deemed that child labor, to which the members of the households are subjected, which is referred to with its macro and micro effects, and which occurs within the family and with the influence of the state, is decided by the heads of households. In the economic model of the study, a method recommended by Krueger (1968) and used by Bhatta and Lobo (2000) is used, which, from a starting point of a Cobb-Douglas type production function, regresses per capita output to being a representation of human capital and factor endowment. It is also possible to speculate on the relationship of heads of households with child labor using methods which are different from this thought process. A decision by heads of households based on whether they were a part of the child labor force as children can be shown as an example of this. However, as the data we have is not sufficient to test such a method, we are directed towards questioning the first method referred to above.

The reason behind this study is the aim to resolve — to a certain extent — the lack of empirical studies, which are not present at sufficient levels due to a lack of data on the phenomenon of child labor, which is frequently emphasized in the literature. At the same time, with this study, the cost of the phenomenon of child labor in Turkey is substantially measured in terms of human capital. The phenomenon of child labor possesses the nature of being a problem which developing countries need to overcome, and which is directly related to the

labor in Lopez-Calva (2001): (1) the poverty of the household; (2) the salaries of children and their parents; (3) the adult unemployment rate; (4) the level of education of the head of the household; (5) social norms and relationships; (6) the legal restrictions and regulations related to child labor; (7) the faults within the credit market; and (8) birth rates and the size of the household.

accumulation of human capital. As presented by the findings of this study, child labor is more prominent in the rural regions of our country. It is considered that, based on these findings, it is important for the state to know where it needs to start in order to solve the issue of child labor in Turkey.

The theoretical framework, which has been established with the information filtered from the literature, and which has been limited to the relationship between child labor and human capital, is referred to in the following chapters. Following the theoretical framework, the model of the study, the definition of the production function used in the model, the representation of the production function in the form of human capital, the research model and the data of the model, explanations and a method of research comprised of assumptions are presented. The research method is followed by the implementation of the model, which includes the findings of the study, and the conclusion headings.

2. The Relationship between Child Labor and Human Capital: Literature and Theoretical Framework

When establishing the theoretical framework, the starting point will be the factors which determine child labor, and the relationship between human capital and child labor — based on education — will be considered under the guidance of the literature. It can be seen that variables such as the poverty status of the household and the level of education of the head of the household have been selected as the factors determining child labor, in the empirical literature. The salaries earned by children do not influence the decision for them to work (Lopez-Calva, 2001, p. 66). This situation is something that is also paid attention to in the theoretical framework of this study. According to this study, the individuals who are the subject of the measurement of output levels are the heads of households, due to their position as the individuals with the final decision on the creation of child labor. Together with this, when considering that human capital is deemed to have a direct relationship with education throughout the study, the final educational levels of children is a matter which is both dependent on a dynamic analysis and which possesses importance.

As an example of these types of analyses, Edmonds et al. (2007) have asked a question of child labor in terms of human capital investments. What was wondered here was whether the adjustment of short and long-term costs, which result from the deregulation of trade, had any effect on the decisions for children to go to school and enter the workforce. This question was examined within the scope of the customs reforms carried out in 1991, and while dramatic increases were seen in the number of children going to school in the rural areas of India, decreases were also determined in the child workforce. The reason for this is that the expense of going to school plays a big role in the relationship between poverty, going to school and the child workforce. According to the findings of the study, from which it was understood that the increase in the national income, which resulted from the customs reforms, had led to a reduction in poverty, there was roughly an increase among half of Indians in terms of going to school, and a decrease among a third of Indians in terms of participation in the child workforce, at this time. What lies behind this change are the reduction of poverty and the creation of the conditions which make it possible to go to school. Another example of these types of analyses is Ranjan (1999), who models child labor and the accumulation of human capital, and exhibits how poverty works together with the defective credit market to increase the levels of child labor in developing countries. In his study, Ray (2000), claims that child labor, particularly among children of a young age, has a destructive impact on the child's intellectual and physical development. He emphasizes that, together with this, it also brings the inevitability of permanent poverty and

working for low wages in their future life.

As an example of the analyses which reflect the negative relationship between child labor and human capital, Bonnal (2009), has found that investments in human capital have the impact of reducing levels of child labor, in his instrumental variable panel data model. According to a survey carried out in 1993, in the Tanga region of Tanzania, Akabayashi and Psacharopoulos (1999) have determined that the increase in working hours has a negative effect on the reading and mathematical skills of the child, while finding a balanced relationship — up to a certain extent — between the child working and the development of human capital.

Among the studies which look at the relationship between child labor and human capital from the aspect of education, Hussain and Maskus (2003), attempt to analyze the interaction between child labor and the accumulation of human capital, from the aspect of schooling. They have concluded that the level of child labor has a negative relationship with the human capital currently possessed by their parents. Together with this, they have shown that the participation in the child workforce has a reducing effect on the accumulation of human capital. In the study by Emerson and Souza (2002), they performed three surveys on national households in 1982, 1988 and 1996, and reached a clear opinion that “child labor hinders education and the accumulation of human capital”. The study of Edmonds and Sharma (2006) on the extent of the negative influence on the children of families who are open to exploitation and abuse, by private lending organizations, in terms of human capital investments. Edmonds and Sharma have observed that private organizations which have been established with the aim of lending money, have a negative effect on the human capital investments in education, and cause increases in the child workforce, and reductions in schooling and attendance rates.

In contrast with the customary view, there are also researchers who refer to the positive aspects of the relationship between child labor and human capital. Fan (2004) has shown that an increase in the productivity of child labor can cause both an increase in child labor and the accumulation of human capital belonging to children². Fan’s model states that any small increase which may occur in the levels of child labor may not have a negative effect on the creation of the human capital belonging to children, and that this can be explained as the positive effect of the financial resources set aside for education being dominant over the negative effect which occurs with the reduced time set aside for studying.

It is also accepted in the literature that the most effective vehicle for eliminating child labor has historically been education and compulsory basic schooling. The relationship between education and child labor is an area of empirical research (Basu, 1999, p. 1092). Jensen and Nielsen (1997), Psacharopoulos (1997) and Grootaert (1998) can be given as examples of these research studies. In this study education is reflected on the economic model via the human capital. When looking at it from this perspective, something else that can be said on the aims of the study, is the lack of studies which look at child labor from the aspect of human capital in Turkey. Together with this, the studies which examine the relationship between child labor and school level education are also quite limited in number. The leading studies amongst these can be said to be as follows: Tunalı (1996), who exhibits that the education levels of parents are among the determining factors of child labor; Tansel (2002), who examines the success of children in school, but does not refer to child labor in his study; and Dayıoğlu and Assaad (2003), who refer to the factors determining child labor, but not to the relationship between child labor and school level education³.

² On the other hand, while not directly related to human capital, it is claimed in the studies by Patrinos and Psacharopoulos (1997), Myers (1989) and Admassie (2003), that education and employment can be carried out simultaneously, and that the child will not be affected too much from this.

³ In world literature the studies which refer to the negative relationship between child labor and school level education are Skoufias

Based on the literature, the following determinations can be made in the direction of establishing the theoretical framework of this study: (1) There is a need for studies at sectoral level in connection with child labor⁴; (2) Social norms, culture and geography take their places as important factor in the analysis of child labor. The phenomenon of child labor should be analyzed by paying regard to the differences between rural and urban regions (Lopez-Calva, 2001, p. 68); (3) Numerous studies show that where parents have obtained a higher level of education their children also have a lower tendency to work (Grootaert, 1998; Salmon, 2005). Higher income levels among parents can also result in similar effects. When considering that these individuals are the ones who decide whether their children work, it is necessary for them to be acknowledged as a point of reference in economic analyses on the matter.

3. The Method of Research

The method of research reflects the theoretical setup coming from the literature. The following subheadings are in this part, respectively: The Model of the Study, The Production Function Used in the Model, The Representation of the Production Function in terms of Factor Endowment and Human Capital and The Explanation of the Data, Assumptions and Limitations. The design that is capable of performing a measurement through making a comparison of a human capital model based on the production function is introduced here.

3.1 The Model of the Study

The main approach which the study is based on is measuring the human capital in terms of output per capita. This measurement is based on momentary timing and in a way aims to measure human capital. The thing to be measured is the amount of output per capita that will be acquired through the accumulation of human capital of household heads whose child between 6 and 17 years of age is employed in child labor or goes on only his/her education. That is because child labor is a dynamic phenomenon, which is influenced by the economic and social status of parents (Hussain & Maskus, 2003, p. 994). In this way, as a result of the comparison of the targeted and measured output amounts, it is possible to observe which group of heads of household has a higher per capita output.

One of the matters that numerous economists, including Lucas (1993), are in agreement on in respect of developing countries, is that the engine of growth is the accumulation of human capital. Where there is a question on the economic efficiency of countries, differences in human capital appear in those countries (Bhatta & Lobo, 2000, p. 394). One of the factors which creates these differences is the factor endowments, which represent the surface area, workforce, capital and entrepreneurship levels in these countries (Chacholiades, 1978). Factor endowments are associated with the participation levels in the workforce, in this study.

The reaching of per capita output from the production function, and the representation of per capita output in terms of marginal product and factor endowments is set out in steps, below.

Let us accept that the functional representation of the production function is represented as the below Equation (1).

$$Y = f(X_0, X_1, \dots, X_n) \quad (1)$$

Here, Y represents the per capita output of considered during the study. The output for each individual is

(1994); Grootaert and Patrinos (1999); Chernichovsky (1985); Ray (2000); Psacharopoulos (1997); Ravallion and Wodon (2000); Assaad et al. (2001); and Levison et al. (2001).

⁴ French (2002) examines the behavior demonstrated by the children employed in the export based shoe industry in Brazil. He contributes to the literature in a specific field related to child labor, by pointing out what types of workplaces young workers are more productive at.

defined as a function of the production factors. It is assumed that the function is homogeneous and possesses a degree of k , and that the first partial derivative of the function for each production factor is higher than zero ($f^i > 0$), while the second partial derivative is lower than zero ($f'' < 0$).

When the simple state of the production function shown in equation (1) is adapted to the variables which have been accepted by the theoretical assumptions in this study, what is displayed is the total output amounts of the heads of the households in accordance with the conditions in the “ i ”th position. P^i represents the total population in the “ i ”th position, while X_j^i represents the J factor in the same position. As the production function is assumed to be homogeneous at degree k , Equation (2) is shown with the assistance of the Euler Theorem, and in a way where the partial derivatives on both sides of the equation have been removed.

$$\begin{aligned} kY^i &= kf^i(X_0^i, X_1^i, \dots, X_n^i), \\ &= \frac{d}{dX_0^i} f(X_0^i, X_1^i, \dots, X_n^i) * X_0^i + \frac{d}{dX_1^i} f(X_0^i, X_1^i, \dots, X_n^i) * X_1^i + \dots + \\ &\quad \frac{d}{dX_n^i} f(X_0^i, X_1^i, \dots, X_n^i) * X_n^i, \\ &= MP_0^i * X_0^i + MP_1^i * X_1^i + \dots MP_n^i * X_n^i \end{aligned} \quad (2)$$

The MP_j^i referred to in Equation (2) is the marginal product of the factor J in position i . When the per capita output in position i is defined as $y_i = (Y_i / P_i)$, and the J factor endowment in position i is defined as $x_j^i = X_j^i / P^i$, it is possible to obtain Equation (3).

$$ky^i = MP_0^i * x_0^i + MP_1^i * x_1^i + \dots + MP_n^i * x_n^i \quad (3)$$

According to Equation (3) the per capita output of the heads of the households can be obtained through the marginal product and the factor endowments. In the following chapters marginal product and factor endowments are transformed into a manner where it is possible to apply theoretical speculation, by reducing them together with the production function to be selected, to human capital and physical capital, subject to various assumptions.

3.2 The Production Function Used in the Model

A Cobb-Douglas type production function has been preferred in order to measure the per capita output in the economic model of this study. In the same way that it has also been stated in Mankiw, Romer and Weil (1992), the function obtained by including the human capital variable to the production function is also taken as a reference in the economic model used in the study, and shown as Equation (4).

$$Y(t) = K(t)^\alpha H(t)^\beta (A(t) L(t))^{1-\alpha-\beta} \quad (4)$$

In the above equation, Y defines the amount of output, K , the capital, L , the work carried out, A , the level of technology, and α , the share of capital in the income. According to Equation (5), H defines the accumulation of human capital.

It is claimed that the estimation power of the economic model has increased following the inclusion of human capital in the production function (Mankiw et al., 1992, pp. 416, 421). The adaptation of the economic model to this study is possible together with certain assumptions. The assumptions required in order to be able to represent the production function in terms of human capital and factor endowment are discussed under the following heading.

3.3 The Representation of the Production Function in Terms of Factor Endowment and Human Capital

The assumption of an amount of output below $\alpha + \beta = 1$ in the production function referred to under the previous heading, and shown in Equation (4) can be regressed to the amount of capital and the amount of human capital. This equation is displayed in Equation (5).

$$Y(t) = K(t)^\alpha H(t)^\beta \quad (5)$$

The restriction of the production function to capital and human capital is possible together with fixed returns of scale. This assumption facilitates the representation of the output amount which is being attempted to be measured in the economic model of the study, by the factor endowment and human capital variables. The enabling of such a transition between the factor endowment and the capital creates a simplifying step which is incidental to the assumptions of the study. There are existing studies which have associated human capital with the production function, and which have attempted to measure them by including the factor endowments in the fixed returns of scale assumption (Hussain & Maskus, 2003, p. 996).

An important point which needs not to be overlooked is the consideration of the production function as per capita output, and as a result of this acknowledgement, the fact that Equation (5) will transform into Equation (6), in the same way as also stated in Equation (3). $k(t)$ and $h(t)$ are the per capita factor endowment and per capita human capital, respectively.

$$y(t) = k(t)^\alpha h(t)^\beta \quad (6)$$

3.4 The Research Model

Referring to the elements which create child labor prepares the grounding for the research model. The micro effects, macro effects, and the factors that is described as poverty and determine the child labor could be called as internal factors in this study. There are three important components of internal factors. The micro effect shown in Figure 1 is determined by the level of consciousness formed by the education level of household head, the mechanisms of decision-making, and the standard of judgment of households. Some obligations of social service organizations of the state and the fulfillment of these obligations are based on the mentality of social policy and state. This factor that forms child labor is called macro effect in Figure 1. One of the main components of the cycle of child labor human capital is shown as poverty in Figure 1.

According to the definition used in this study, poverty is a social status which defines families who are a significant level below the average income level. While, with its inherent components, poverty is a type of micro effect, as also stated in the literature, due to the fact that it is an economic factor which goes further than the level of consciousness of the members of the household, is one of the most significant determining factors of child labor. Therefore, in this study it is discussed under a different heading, which is independent of its micro effects, in this study.

It is accepted that the child labor has been affected by internal factors and it has been related with human capital according to the model on which this study is based. This relationship is established over production function and the output per capita has been reduced to the sum of factor endowment per capita and human capital accumulation.

Another assumption particular to the study is that the effects of per capita factor endowments which will create a difference have been considered. The relationship between the factor endowment and the amount of output is based on modern foreign trade theory. In situations where there is to be a comparison between countries, even if every country possesses a different factor endowment, in accordance with modern foreign trade theory, a

single production function can represent the countries (Krueger, 1968, p. 641). This approach, which has been put forward at the macroeconomic level, is based on the acceptance that the differences in factor endowments belonging to individuals can be at a level where they can be ignored, in this study which is considered at the microeconomic level, and which discusses the issue of child labor, which is dependent fully on inherent factors. As a result of this acceptance, the per capita output amounts are regressed to the notion which is obtained by measuring human capital, and which is described as the output amount resulting from human capital in Figure 2.

It is well-known that child labor can also pull adult salaries lower under certain circumstances, and thus cause a vicious cycle of poverty (Lopez-Calva, 2001, p. 60). The fundamental point which this cycle, which is defined as the cycle of child labor and human capital, and which makes it possible to see the cycle between poverty and the human development process from the perspective of child labor, is dependent on the fact that the output amounts resulting from the human capital of individuals belonging to different groups can be compared. Situations which result in human development or the continuation of the vicious cycle of poverty surface as a result of this comparison.

According to the model of the study, the amount of output created by human capital is obtained from two main groups. The first group consists of the household heads whose children are not in the child labor and as to the second group; it consists of the household heads whose children are within the child labor. The household heads that constitute the second group are separated into two groups, as well. The first of these is the household heads whose children are within the child labor while going on their education. The other one is the household heads whose children are only within the child labor and has ceased their education.

In research model of the study, a comparison is made between the output amounts resulting from the heads of the households whose children are among the child workforce, and the heads of the households, whose children only go to school, and do not participate in the child workforce.

It is examined whether these situations may cause a humane development or vicious cycle of poverty by calculating the human capital accumulation of these groups. The reliability of these examined results have been controlled by a statistical method, "the probit analysis".

3.5 The Explanation of the Data, Assumptions and Limitations

The data used in this study has been obtained from the Turkstat (2006) Working Children data set. The scope of this survey is approximately 20.000 households whose children between the ages of 6-17 work. Due to the assumptions of the study, those households which do not conform to the characteristics of a nuclear family have been left outside the scope of this study. A nuclear family is defined as a family where one of the parents is not missing. With this definition, it is considered that such families are exempt from the sociological factors which might influence child labor. According to this assumption, the number of nuclear families surveyed is 13.428. With the children of these families being surveyed, the number of observations is determined as "24.766".

Certain variables, which were thought to have been necessary in the economic model, but which are not directly included in the data set have been derived within the framework of certain assumptions. The data on the levels of education of the heads of the households, which is used in the study, can be shown as an example of this. The data set also includes a classification of the schools which the individuals have graduated from. According to one assumption, this classification is in itself divided into two, with the values "0" (meaning uneducated) and "1" (meaning educated) assigned to the first and second sections respectively. Thus the levels of education of the individuals are hypothetically created.

It is only possible to measure the accumulation of human capital numerically, which is one of the aims of the study, with a number of assumptions. In this study, the set off point is the fundamental assumption that education levels can be accepted as being an underlying indicator of human capital (Kruger, 1968). The level of education has been selected as the indicator of human capital and this level of education has been classified within itself. As well as their levels of education, individuals have also been classified and assessed according to age categories.

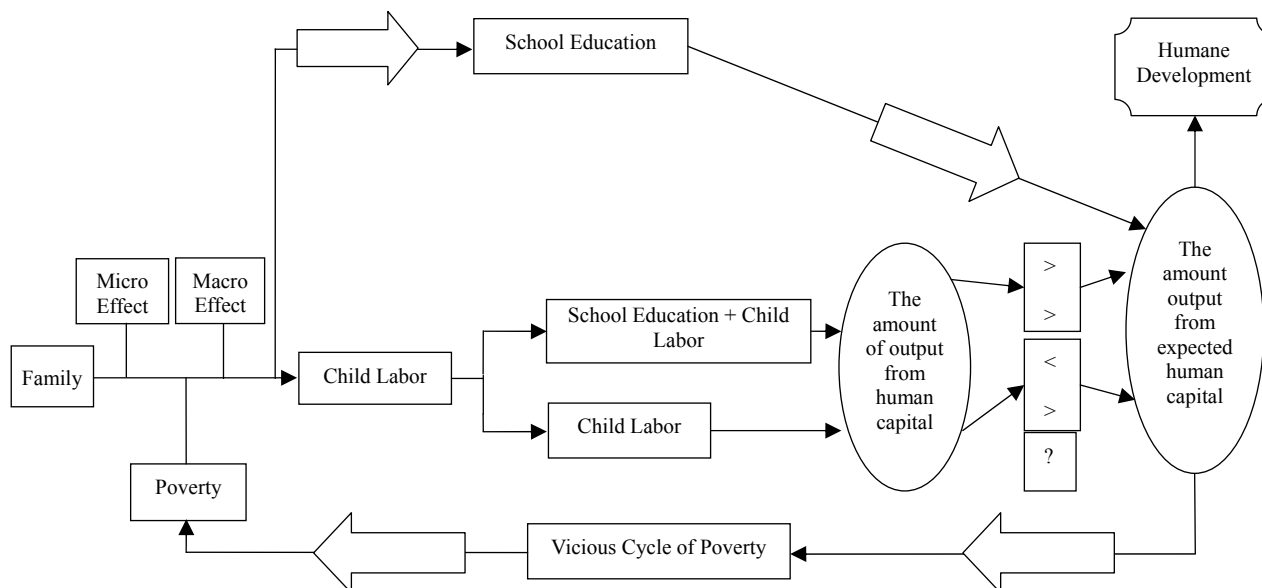


Figure 1 The Cycle of Poverty, Child Labor and Human Capital

Source: Designed by basing on the theoretical frame of the literature

It would be beneficial to state — with regard to the scope of the study — that while increasing the number of variables will help to obtain clearer results in the measurements of human capital, the dimensions of this extend as far as socio-cultural and difficult to calculate values on one side. The fact that variables such as education and income represent human capital seems to be a consistent and correct approach in view of the fact that individuals from the same country who possess similar socio-economic characteristics will be compared with each other, and sets forth the boundaries of this study.

4. The Implementation of the Research

In this part of the study, first of all, data on human capital is obtained as a result of surveys. At the next stage, the output amount resulting from human capital according to the envisioned model and method is measured. The conclusion is reached by evaluating the findings of the measurement.

4.1 The Collection of Data, Method of Measurement and Measurement Results

According to the economic model of the study, in this section, which covers the tables from Tables 1-4, the population and income data used in the measurement of the human capital of the heads of households whose children do not go to school but are part of the child workforce, in the urban regions of Turkey, are discussed. The measurement results obtained by using this data to measure the human capital of the heads of households, who are considered to be the ones making the decision on child labor, are shown in this table. The processing of population and income data after they are obtained is discussed in the sub-headings, below.

4.1.1 The Collection of Population and Income Data

The population and income data used in the measurement of the human capital of heads of households with children in the 6-17 age group, in both the urban and rural areas of Turkey, are shown in Tables 1-4. When preparing the tables, three different circumstances were considered within the scope of the theoretical framework. The following criteria was classified separately for rural and urban areas, in respect of the male and female children of the heads of the households which were selected to be used in the measurements: “being a part of the child workforce and not continuing school”; “being both a part of the child workforce and continuing school”; and “continuing school and not being a part of the child workforce”.

Table 1 shows the population and income data used in the measurement of the human capital of the heads of the households in urban regions, whose male and female children are part of the child workforce and do not go to school. The age groups in the first column of Table 1 are the classification belonging to the heads of the households. In order to simplify the table only heads of households in the 45-49 age group have been used in the calculations. The last column contains the representations of the total population and income for the age categories. According to the total population data, the number of heads of households in urban areas, whose male and female children are a part of the child workforce and do not go to school, is 484. The first row of Table 1 contains coded numbers from 0 to 6, which represent higher levels of education as the numbers increase.

Table 1 The Population Used in the Measurement of the Human Capital of the Heads of Households in Urban Regions, Whose Male and Female Children Are a Part of the Child Workforce and Who Do Not Go to School

Urban	Child Labor	0	1	2	3	4	5	6	
									Total
Age									
45-49	Population	5	14	63	8	4	2	2	98
	Income	1350	2390	23914	6270	4240	2800	1980	42944
Total Population		38	51	330	36	16	6	7	484

Note: 0. Others, 1. Literate without any diploma, 2. Primary school (5 years), 3. Primary school (8 yıl), Junior high school or Vocational junior high school, 4. High school, 5. Vocational high school, 6. Universities and other higher educational institutions
Source: Obtained from the enquiries made into the Turkstat (2006) data.

4.1.2 The Method of Measuring Human Capital and Measurement Results

The measurement stages of the human capital of the heads of the households in the urban and rural areas of Turkey, with children in the 6-17 age group are shown in Tables 2-4. The summary tables which respectively cover “the obtaining of average income”, “the obtaining of human capital coefficients” and “the measurement of human capital” of the heads of the households in the urban areas, whose children are a part of the child workforce, and who do not go to school. Table 2 is a table which has been obtained from Table 1. However, the difference between Table 1 and Table 2 is that the latter contains mean income data obtained by dividing income into population, rather than the income data contained in Table 1, and the “0 (other than those specified)” option in the third column of Table 1 has not been included in Table 2, as it does not carry any meaning.

The measurement of the human capital of the heads of the households whose children are a part of the child workforce, and who are literate but have not graduated from any type of school, or those who have completed primary school, or those who have completed primary and secondary school or vocational secondary school, or those who have graduated from high school or vocational high school, or those who have completed higher education, has been carried out for each age group, using the method set out below. If we consider, as an example,

the total human capital of the individuals who belong to the 45-49 age group of heads of households who are literate but have not completed any type of school, the human capital of the heads of households in a specific age group (45-49) will be the total of the human capital contributions from all levels of education. That is because being literate is actually the previous step to all other levels of education. The total human capital resulting from education levels is, mathematically speaking, equal to the multiplication of the marginal productivities and the factor endowments. The marginal productivities are obtained by dividing the total income of the individuals within the examined category by the total population of the individuals within this same category. The marginal productivities are represented as mean income in Table 2.

Table 2 The Calculation of the Mean Income of the Heads of the Households in Urban Areas, Whose Children Are a Part of the Child Workforce and Do Not Go to School

Urban	Child Labor	1	2	3	4	5	6	
								Total
Age								
45-49	Population	14	63	8	4	2	2	93
	Average Income	170.71	379.58	783.75	1060	1400	990	
Total Population		51	330	36	16	6	7	446
Total Population of Survey								446

Note: 1. Literate without any diploma, 2. Primary school (5years), 3. Primary school (8 yıl), Junior high school or Vocational junior high school, 4. High school, 5. Vocational high school, 6. Universities and other higher educational institutions

Source: Obtained from the enquiries made into the Turkstat (2006) data.

Factor endowments are calculated by dividing the heads of the households who are literate but have not completed any type of school into the total population of individuals who possess any level of education. When the human capital amount from the heads of the households who are literate but have not completed any type of school is calculated, it is automatically considered that an individual who has completed higher education has also completed the lower levels of education. Accordingly, in the row related to the 45-49 age group in Table 3, the total of the human capital of the heads of the households who have not completed any type of school has been calculated using the below formula. The results have been represented in Table 4 under the definition of human capital.

(45-49) age group

(literate but have not completed any type of school) $MP_i = (2390)/(14) = 170.71$

Unit Value

(45-49) age group

(literate but have not completed any type of school) $x_i = (14) / (446) + (63) / (446)$
 $+ (8) / (446) + (4) / (446)$
 $+ (2) / (446) + (2) / (446)$
 $= 0.2085$

The calculated total human capital

$= MP_i * x_i$
 $= (170.71) * (0.2085)$
 $= 35.59 \text{ Unit Value}$

Table 3 The Calculation of the Human Capital Coefficients of the Heads of the Households in the City, Whose Children Are a Part of the Child Workforce And Do Not Go to School

Urban	Child Labor	1	2	3	4	5	6	
Age								Toplam
45-49	Human Capital	0.20	0.17	0.03	0.01	0.008	0.004	93
	Average Income	170.71	379.58	783.75	1060	1400	990	
Total Population								446
Total Population of Survey								446

Note: 1. Literate without any diploma, 2. Primary school (5 years), 3. Primary school (8 yıl), Junior high school or Vocational junior high school, 4. High school, 5. Vocational high school, 6. Universities and other higher educational institutions

Source: Obtained from the enquiries made into the Turkstat (2006) data.

Table 4 The Human Capital of the Heads of the Households in the City, Whose Children Are a Part of the Child Workforce and Do Not Go to School

Urban	Child Labor	1	2	3	4	5	6	
Age								Total
45-49	Total Human Capital	35.59	67.23	28.11	19.01	12.55	4.43	166.95
Total Human Capital		294.43	370.40	100.57	59.37	19.09	11.72	855.61
Total Population								446
Total Population of Survey								446

Note: 1. Literate without any diploma, 2. Primary school (5 years), 3. Primary school (8 yıl), Junior high school or Vocational junior high school, 4. High school, 5. Vocational high school, 6. Universities and other higher educational institutions

Source: Obtained from the enquiries made into the Turkstat (2006) data.

4.2 Findings: The Evaluation of the Measurement Results

The Figure 2 below shows being tested of the following hypothesis “*If there had been no child labor as a result of poverty, and with the decisions made by the household in Turkey, then the accumulation of human capital would be higher than what it is today*” of the economic model used in the study.

The Figure 2 reflects the status carried into practice through the theoretical model of cyclical conditions related with the child labor that has been tried to be explained by the Figure 1. While the figures represented by “*” within the boxes of Figure 2 reflects the measurements of urban regions, the figures represented by “#” stands for the measurements of rural regions. Through these measurements, the amount of output created by the human capital of child labor has been compared with the amount of expected human capital within the child labor is not included. According to the results of this comparison, it has been concluded that “the amount of output created by the expected human capital” is much more than “the amount of output created by human capital” in both conditions of rural and urban regions. This case verifies the hypothesis of this study mentioned above for the rural and urban regions and suggests that the way resulting in “the vicious cycle of poverty” and highlighted with a bold line is followed. The statistical reliability of the results has been proven through probit analyses and more detailed information could be found in the main text.

A point which needs attention, with regard to the numbers within the boxes in Figure 2 is the manner in which the numbers which are the result of the mathematical approach which has been observed when calculating the output amount resulting from the human capital of child labor, are regressed. The outputs resulting from the human capital of 1193 Unit Value and 855 Unit Value, which have been calculated per person in the urban regions, has been regressed to the equivalent of 498 Unit Value, as a result of the approach which was used. Another

approach here is to take the mean of the per capital values of 1193 and 855, but from the very beginning of the design of the economic model the general diagram has been considered as being similar to an electrical circuit, and the calculations made according to the logic of this assumption. The situations which are affected by the phenomenon of child labor have been considered as resistors are connected to each other in a parallel manner, as also represented in Figure 2. That is because there needs to be a preference made here between the circumstances. In electrical circuits, when the numbers of the resistors which are connected to each other in a parallel manner increase, this results in a decrease in resistance. Equivalent resistance is calculated using the formula “ $1/R = 1/R_1 + 1/R_2$ ”. That is to say, the 498 Unit Value, which is the per capita output created by human capital in urban regions is calculated with the solution to the equation $1/R = 1/1193 + 1/855$.

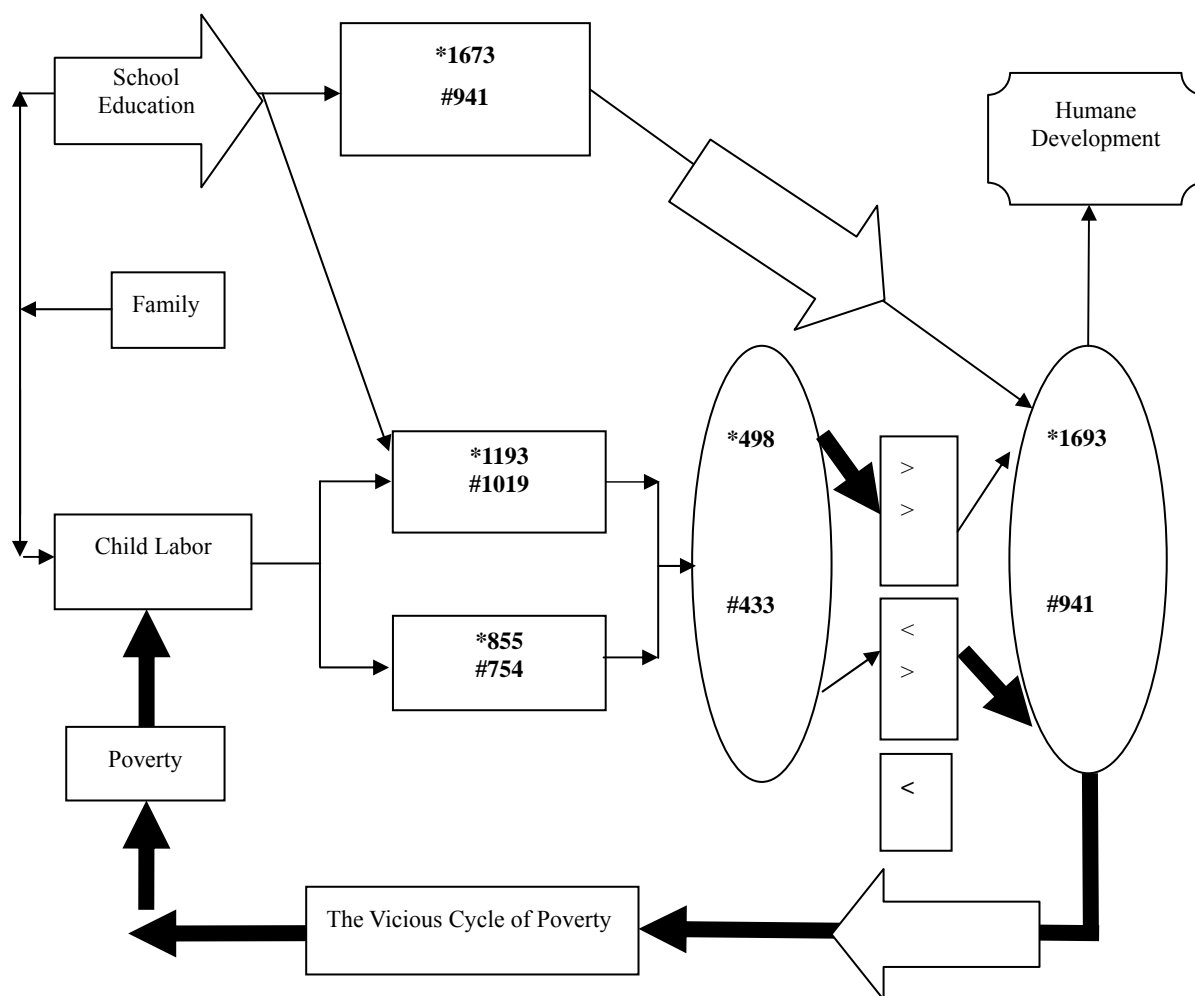


Figure 2 The Vicious Cycle of Poverty Caused by Child Labor

Source: Designed to reflect the theoretical model by taking the Figure 1 as a reference

4.3 The Testing of the Data: The Results of the Probit Analysis

Probit analysis is performed to test the accuracy of the data. Dependent variable child labor is regressed by literate situation, education level and total income of household head. In this paper, it is assumed that the household head gives the decision if a child work or not. So testing the statistical relationship between household head and these variables, which the theory of this article based on, will give a reasonable explanation of the data is confident.

According to the results of the probit analysis as indicated in Table 5, it has been found that the employment of child labor has a significant and negatively correlated relationship with the literacy situation of household head at the first stage, the level of education at the second stage, and the level of total income at the third stage, and this has been represented in Table 5. At the stage four, all the variables are included in the regression at the same time. The signs and significances of variables are protected. But although the literate situation variable protects its value in terms of its significance, the significance levels of the education and income level of household head variables are reduced from 0.01 to 0.05.

Table 5 The Probit Test: The Education and Income Characteristics of the Head of the Household who Influences the Employment of Child Labor

Variables	First Stage, Observation = 24766, pseudo R-squareds = 0.0020		Second Stage, Observation = 24766, pseudo R-squareds = 0.0243		Third Stage, Observation = 24766, pseudo R-squareds = 0.0055		Fourth Stage, Observation = 24766, pseudo R-squareds = 0.0255	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Child labor (dependent variable)								
Literate situation of household head	-0.23***	-0.049					-0.121***	0.050
Education level of household head			-0.62***	0.043			-0.586**	0.045
Total income of household head					-0.00018***	0.00002	-0.00005**	0.00002
constant	-1.38***	0.047	-1.50***	0.013	-1.506***	-0.01790	-1.37***	0.048

Note: ***, **, * indicates 1%, 5% and 10% significance level.

5. Conclusion

This study questions whether the phenomenon of child labor resulted from the decisions household that are affected from the poverty, micro, and macro factors exposed by the nuclear families in rural and urban regions of Turkey will result in the vicious cycle of poverty or humane development via the human capital model based on production function. The people subject to this questioning are either those whose children are within the labor force or the decision makers of child labor.

According to the results obtained from the model, it has been concluded that the existence of the phenomenon of child labor in either rural or urban regions of Turkey causes the loss of the accumulation of human capital. The measurement has been performed from two main routes. On the first route are the heads of the households whose children are employed. The per capita output of the heads of the households, whose children only go to work, and that of the households whose children both go to work and school, is measured in this group, and the per capita output in the urban areas has been calculated as higher than the per capita output in the rural areas. The second route contains only the heads of the households whose children only go to school. It has been calculated here that the per capita output resulting from the human capital of the heads of the households in this group is higher than the per capita output resulting from the human capital of the heads of the households who send their children only to work — both in the urban and the rural regions. In the model where there is an assessment made between the urban and rural regions, it has been suggested that according to the rationale set forth by the disequilibrium equation of the phenomenon of child labor created by the decisions of household end up with the vicious cycle of poverty.

This study is being carried out with the aim of resolving the deficiency of empirical studies — up to a certain point — which are insufficient in number due to a lack of data on the phenomenon of child labor, and which is also frequently emphasized in the literature. The phenomenon of child labor is something which has a direct relationship with the accumulation of human capital and which is an issue that developing countries need to overcome. As displayed by the findings of this study, child labor is encountered much more in the rural areas of our country. One of the other problems in these areas where the opportunities for education and income are insufficient is the extensive presence of a grey economy. Children who work in the fields are also deprived of their own human capital in this way. This is an issue which can be overcome by those who make the decision as to whether children will work, becoming more informed. There is a need for more empirical studies on this issue, which is a problem able to cause poverty to become an intergenerational cycle by being transferred from one generation to the next.

The phenomenon of child labor is created by micro effects, which are contained in the poverty influencing the family decision making mechanism, and macro effects, which are contained in the policies of the state on the issue of child labor. While sending their children to work as part of the child workforce is seen as a way of increasing the income of families which are suffering from poverty, it is also a very important sociological and economic problem which can result in the losses of human capital accumulation for a country. The state can provide support to families by the amounts of income they would obtain by sending their children to work, in order to prevent these losses in human capital. Ravallion and Wooden (2000) have shown that a subsidy program reducing schooling expenses, and having the aim of increasing school participation rates in the rural areas of Bangladesh, did increase schooling levels and lower the levels of child labor. Similarly, Edmonds (2006) has determined that social assistance (income) provided to families in South Africa increased schooling level and reduced the total number of hours worked by children.

The calculation of the economic cost of this assistance is an important research question which can be the subject of another study. That will be a matter concerning whether a decision made by politicians following these calculations is sufficient to cover the cost of eliminating the problem of child labor. However, it should not be forgotten that human capital accumulations represent an engine in terms of the growth of the economies of developing countries. In conclusion, while pointing out that the issue of child labor does exist in developing countries like Turkey, it is also shown in this study that losses in human capital are unavoidably being experienced. This situation can lead to the phenomenon of poverty, which is a cause and an input of child labor, being transformed into an output of child labor, and create a vicious cycle of poverty for families whose children are or have been part of the child workforce. The responsibility for breaking this cycle rests with the state and with policy makers. Making the heads of households, who are the decision makers in this respect, more informed and more aware of the disadvantages may be possible through education. Hussain and Maskus (2003) especially emphasize that increasing the levels of education of adults in poor countries has an important impact on decreasing the levels of child labor. On the other hand, this study reveals that the said poverty cycle is experienced more widely in rural areas. One of the reasons for this is the existence of the grey economy, which the state is finding difficult to solve.

The study proves that if the loss of human capital in the country is not desired in the long run, the vicious cycle of poverty caused by the child labor could be overcome by raising the awareness of the household heads. This awareness-raising could be possible by enhancing the factors such as the level of education and income that are components of human capital.

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