Using Multinomial Logistic Regression to Examine the Relationship Between Children's Work Status and Demographic Characteristics

Yrd. Doç. Dr. Erkan ARI
Dumlupınar Üniversitesi İİBF
Ekonometri Bölümü
erkan.ari@dpu.edu.tr

Abstract

This study aims to examine the relationship between children's work status and their demographic characteristics using multinomial logistic regression. To this end, data collected by TUIK's (Turkish Statistical Institute) "Child Labor Force Survey, 2012," conducted with the participation of 27,118 children, were used. At the first stage of the analysis, eight independent variables on the demographic characteristics of the participants were examined using the chi-square test of independence, the variable that was not significant was removed, and the subsequent analyses were conducted using the remaining seven variables. The validity of the model in the study was examined using maximum likelihood estimation, and the model was significant. Odds ratios of the variables in the model were calculated, and two-category comparisons were made on the basis of the reference category using odds ratio coefficients. In comparisons 1 and 2, odds ratio coefficients for the variables rural/urban, gender, age group, household size, literacy, school attendance, and level of education of the head of household were significant.

Keywords: Children; Working Children; Multinomial logistic regression.

JEL Classification Codes: C4, C40, D7, D71

1. Introduction

Human life comprises different phases from birth to death. The most important of all these phases is childhood since it is the period when physical, mental, and psychological development mostly occurs (Fidan, 2004:31). According to Article 1 of the United Nations Convention on the Rights of the Child, every individual below the age of eighteen is a child. A child, according to society, in turn, is an individual who depends on someone else and has not reached a level of maturity that allows him or her to take responsibility (Ağacabay, 2012). The Confederation of Turkish Trade Unions (Türk-İş) defines the child as follows: Human beings who have not yet basically assumed the burden of life; are under the guardianship of the family and the state, and protected by other institutions and organisations as well; could complete his or her physical and mental development in a wholesome way; be prepared for the future through proper education; and constitute the prospective qualified force of the society (Kahramanoğlu, 1996:11; Günöz, 2007:4).

The child and issues related to children are issues that should be dealt with utmost care. One of the important issues that many developing countries

(including Turkey) experience and yet has to be resolved is child labour. Child labour was listed among the ten most important problems that persist in the 21st century, in addition to starvation, poverty, war and peace, and protection of the environment, in a report prepared by World Vision, which provides insight about the importance of the issue (Kayhan, 2012:188).

In general, working children can be defined as individuals below the age of 18, who have to work to earn his or her livelihood or to make a contribution to the family budget (Kolk and Tulder, 2002:293; Fidan, 2004:31). In order to reveal different aspects of the concept of working children, to measure the work of the child in a satisfactory way, efforts have been ongoing to develop definitions and typologies of the concepts of "child and childhood," "the value of the child," "child work," and "child labour," and to delineate between activities of the child that should be considered as "socialisation" and "education," and as "labour" and "exploitation" (Köksal and Lordoğlu, 1993:17-18; Karaman and Özçalık, 2005:31).

Factors that force children to work should be studied thoroughly, and eliminated through short- and long-term plans. Poverty is the leading factor among all these. Families that do not have sufficient budgets and suffer from economic difficulties force their children to work. It can be suggested that factors such as the unemployment of senior members of the family, migration and related causes, traditional perspectives, low level of parental education, legislative shortcomings, a lack of supervision, employers' preference to employ children, flaws in the education system, and children's unwillingness to attend to school (level of attendance in formal education) push children to work (Günöz, 2007:7-8).

In urban areas, children work in the industrial, trade, and service sectors, and on streets due to the effects of migration; and in rural areas, depending on the type of work and seasons, they mostly work at agriculture as seasonal workers or unpaid family workers (Republic of Turkey, Ministry of Labour and Social Security, General Directorate of Labour statistics). Sixty percent of child workers are employed in agriculture, 26% in services, and 7% in industry; however, considering the fact that these are official figures, it is suggested that the outlook of child labour in the world is much gloomier since reliable statistics and databases are not available due to the degree of informality, which forces children to work in agriculture, on the streets, or in small businesses (Kayhan, 2012:189). The distribution of child labour in the world among countries is given in Table 1 below.

Table 1: The Global Distribution of Child Labour Among Countries

Country	%	Country	%
Algeria	1.63	Hungary	0.17
Cameroon	25.25	Italy	0.38
Egypt	11.23	Portugal	1.76
Kenya	41.27	Argentina	4.53
Morocco	5.61	Bolivia	14.36
Nigeria	25.75	Brazil	16.09
Senegal	31.36	Colombia	6.22
Uganda	45.31	Guatemala	6.22
Zambia	29.44	Haiti	25.30
Zimbabwe	29.44	Mexico	6.73
Bangladesh	30.12	Nicaragua	4.05
China	11.55	Paraguay	7.87
India	14.37	Uruguay	2.08
Indonesia	9.55	Turkey	24.00
Pakistan	17.67		

Source: Boukhari, Construir Futuro, inventir en la infancia: Estudio economico de los costos y beneficious de erradicar al trabojo en Iberoamerica, ILO, San Jose, Costa Rica, September 2005. (Cited by: Karaman and Özçalık, 2007:35).

Surveys on child labour include the children who take responsibility for domestic work such as cooking, doing laundry, cleaning, shopping, and taking care of younger siblings, apart from those who are employed in economic work. Almost three quarters of girls 15 to 17 years of age are engaged in domestic work both in the countryside and in urban districts (Republic of Turkey Ministry of Labour and Social Security, General Directorate of Labour statistics).

Child labour may have many undesirable consequences. Children are faced with physical and psychological risks that might affect them throughout their lives. Physical problems such as experiencing accidents that can cause physical injuries due to harsh conditions of work, being exposed to cold and unfavourable environmental conditions, getting into bad habits, experiencing sexual harassment, and poor health due to various reasons may occur. Child labour can also cause psychological problems in children as they are working even though they are simply children whose needs are supposed to be satisfied by their families, who are supposed to play games, and go to school. In a study conducted on working children in our country, a lack of self-respect, shyness, feelings of guilt, suicidal thoughts, adverse social behaviours, lack of self-confidence, depression, fear of the opposite sex, maladjustment, and anxiety have frequently been observed. Furthermore, it was revealed that these children intensely experience the feeling of fear, as they are rebuked when they do the job wrong and accordingly experience maltreatment (Fidan, 2004; Tor, 2010: 36).

In this study, the correlation between children's work status and demographic characteristics was analysed with a multinomial logistic regression model by employing the Turkish Statistical Institute's (TUIK) micro data set, the Working Children Survey 2012. Owing to the quite elaborate data collected by TUIK, the demographic variables that force children to work have been addressed in the study.

Multinomial logistic regression models were used for estimations where the dependent variable had more than two categories that are discrete, have nominal characteristics, and were not ordered; the dependent variable of which exhibit multinomial distribution, while there are constraints over independent variables. (Hosmer and Lemeshow, 2000).

2. Method

The work status and demographic characteristics of children were investigated in the study with a multinomial logistic regression model using the "Working Children in Turkey micro data set (2012)" of the recent survey compiled by TUİK. The questionnaire was applied to 27,918 children by TUIK throughout Turkey. Eight independent variables of demographic characteristics of children were examined using the chi-square test of independence, and after excluding a variable that was not significant, the subsequent analyses were conducted using the remaining seven variables that are believed to force children to work. Using the maximum likelihood estimator of the model examined in the research, the odds ratios of the variables that compose the model were obtained. The validity of the model was tested with a likelihood ratio test. The data obtained from the study were analysed with the aid of STATA package software.

The nominal dependent variable of the study was the work status of children. The work status of children was organised as follows: 1: those who are engaged in economic activity; 2: those who do housework; and 3: those who do not work. Demographic variables that are believed to have an impact on children's work status are gender, rural/urban distinction in terms of place of residence, age group, size of household, literacy status, the status of formal education attendance, educational status of the householder (father or mother). Independent variables employed in the study and their levels are given in Table 2.

Table 2: The Levels of Independent Variables Used in the Study

Independent Variables	Levels of Independent Variables
X1: Rural/Urban	1: Rural (residential areas with a population equal to or less than 20,000) 2: Urban (residential areas with a population equal to or greater than 20,001)
X2: Gender	1: Male 2: Female
X3: Age group	1: 6-14 2:15-17
X4: Size of household	1: 1-4 2: 5-6 3: 7 or more
X5: Literacy status	1:Yes 2: No 3: Still learning
X6: Status of formal education	1:Yes 2:No
X7: Educational status of the householder (father or mother)	1:Illiterate 2:Literate, no formal education 3:Primary school graduate 4:Primary education 5:Secondary school

Table 3 presents information on the demographic characteristics of the children who participated in the survey.

Table 3: Descriptive Statistics on Demographic Characteristics of Children Who Participated in the Survey

Demographic Information	N	%
Rural/Urban		
Rural	7726	28.49
Urban	19392	71.51
Gender		
Male	13841	51.04
Female	13277	48.96
Age Group		
6-14	20084	74.06
14-17	7034	25.94
Size of Household		
1-4 persons	11355	41.87
5-6 persons	10359	38.20
7 or more	5404	19.93
Literacy Status		

Demographic Information	N	%
Yes	17806	65.26
No	725	2.67
Still learning	8587	31.67
Status of Formal Education Attendance		
Yes	24861	91.68
No	2257	8.32
Educational Status of the Householder		
Illiterate	2214	7.80
Literate, no formal education	1415	5.22
Primary school graduate	13327	49.14
Secondary school graduate	164	0.60
General high school	2884	10.64
Vocational high school	2162	7.97
Undergraduate	2969	10.95

Table 1 shows that 28.49% (f=7726) of the children who participated in the survey were living in the countryside, whereas 71.51% (f=19392) were living in urban areas. An examination of the gender of children shows that 51.04% (f=13841) were male, and 48.96% (f=13277) of them were female. In terms of the age group of children, 74.06% (f=20084) were between 6 and 14 years of age, and 25.94% (f=7034) were between 14 and 17 years of age. Considering the household size in the survey, it is seen that 41.87% (f=11355) of the households had 1-4 members, 38.20% (f=10359) had 5-6 members, and 19.93% (f=5404) had 7 or more members. In terms of the literacy status of the children, it is seen that 65.26% (f=17806) were literate, 2.67% (f=765) were illiterate, and 31.67% (f=8587) were still learning how to read and write. An examination of the children's formal education attendance shows that 91.68% (f=24861) attended formal education, whereas 8.32% (f=2257) did not. Considering the educational status of the householders (mother or father) in the survey, 7.80% (f=2214) were illiterate. Moreover, 5.22% (f=1415) were literate, but did not attend to formal education, 49.14% (f=13327) were primary school graduates, 0.60% (f=164) were secondary school graduates, 10.64% (f=2884) were general

high school graduates, 7.97% (f=2162) were vocational high school graduates, and 10.95% (f=2969) had a bachelor's degree.

2.1. Multinomial Logistic Regression Model

While the regression analysis is used in social sciences when the number of dependent variable categories are two, multinomial logistic regression is employed when dependent variables involve three or more categories. This explains the correlation between the dependent variable and the independent variable when their values are obtained with rating scales (Washington et al., 2003; Hosmer et al., 2013).

The multinomial logistic regression model, in which dependent variables are more than two, discrete and non-ordered categories that have nominal properties, and exhibit multinomial distribution, is an expansion of the binomial logistic distribution for the category. A multinomial logistic regression with a dependent variable that has a single category must have "J-1" logistic regression models (Liao, 1994; Long and Greese, 2006).

The probability of a dependent variable to be in the nth category in a multinomial logistic regression model is expressed as given in Equation 1 (Liao, 1994).

$$\pi_j = \frac{exp(\sum_{k=1}^{K} \beta_{jk} x_k)}{1+\sum_{j=1}^{J-1}(\sum_{k=1}^{K} \beta_{jk} x_k)} \quad j = 1,2,\dots,J-1 \tag{1}$$

It is possible to write this definition in Equation 2 as well:

$$\pi_j = \frac{1}{1+\sum_{j=1}^{J-1} exp-(\sum_{k=1}^{K} \beta_{jk} x_k)} \tag{2}$$

While the subscript k in ... coefficient in Equation 2 denotes the dependent variable, the subscript j is used to denote the dependent variable category.

The sum of probabilities of categories that belong to the dependent variable should be "1" as in binary. For example, in a multinomial logistic regression in which the number of dependent variable categories (D) have 3 levels, the sum of probabilities of each category is equal to "1".

$$P(D = 0|x) + P(D = 1|x) + P(D = 2|x) = 1 \tag{3}$$

In models with dependent variables that have more than 2 categories, a baseline category should be determined in order to make comparisons or analyses. The baseline category (J) can be selected arbitrarily by the package software (Hosmer and Lemeshow, 2000). For instance, the baseline category can be selected as 0 for a dependent variable that consists of 0, 1, 2, and 3 categories. Therefore, in the comparison, three different logistic models are obtained that comprise 0 and 1, 0 and 2, 0 and 3. Hence, for a model, the dependent variable of which has four categories, three odds ratios are calculated, each category is compared with these ratios, and the model is linearised by taking the natural logarithms of these odds ratios to obtain logistic models.

If J is selected as the baseline category, the probability of the dependent variable to lie within the baseline category is defined as given in Equation 4 (Liao, 1994).

$$\pi_J = P(y = J) = \frac{1}{1+\sum_{j=1}^{J-1} exp[(\sum_{k=1}^{K} \beta_{jk} x_k)]} \; j = 1,2, \dots, J-1. \tag{4}$$

Furthermore, the probability to lie within the baseline category can be computed with the help of other probabilities as given in Equation 5, if the other probabilities are known (Liao, 1994).

$$\pi_J = P(y = J) = 1 - [P(y = 1) + P(y = 2) + \cdots + P(y = J-1)] \tag{5}$$

In a multinomial logistic regression model, the logit transformation is obtained by taking the logarithms of the odds ratios after selecting the baseline category. For the four category example, when 0 is selected as the baseline category, the logarithms of odds ratios can be obtained as given in Equation 6, Equation 7, and Equation 8 (Kienbaum and Klein, 2010).

$$ln\left[\frac{P(y=1|x_1)}{P(y=0|x_1)}\right] = \beta_1 + \beta_{11} x_1 \tag{6}$$

$$ln\left[\frac{P(y=1|x_2)}{P(y=0|x_1)}\right] = \beta_2 + \beta_{21} x_1 \tag{7}$$

$$ln\left[\frac{P(y=1|x_3)}{P(y=0|x_1)}\right] = \beta_3 + \beta_{31} x_1 \tag{8}$$

As is seen, the baseline category is taken as "$y = 0$" in all three odds ratios. The notation of the model can be generalised as in Equation 9 with all these given (Liao, 1994).

$$ln\left[\pi_j/\pi_J\right] = ln\left[\frac{P(y=j)}{P(y=J)}\right] = ln\left[\frac{\frac{\exp\left(\sum_{k=1}^{K}\beta_{jk}x_k\right)}{1+\sum_{j=1}^{J-1}exp\left[\left(\sum_{k=1}^{K}\beta_{jk}x_k\right)\right]}}{\frac{1}{1+\sum_{j=1}^{J-1}exp\left[\left(\sum_{k=1}^{K}\beta_{jk}x_k\right)\right]}}\right]$$

$$ln\left[\pi_j/\pi_J\right] = ln\left[\frac{P(y=j)}{P(y=J)}\right] = ln\left[exp\left(\sum_{k=1}^{K}\beta_{jk}x_k\right)\right]$$

$$ln\left[\pi_j/\pi_J\right] = ln\left[\frac{P(y=j)}{P(y=J)}\right] = \left(\sum_{k=1}^{K}\beta_{jk}x_k\right) \quad j = 1, \dots, J-1 \qquad (9)$$

As Equation 9 indicates, multinomial logistic regression model can be transformed into binary logit model for $J = 2$.

3. Findings

In the study, the third category of the dependent variable, "non-worker," was taken as the baseline category, while the first category of the independent variables was taken as the baseline category and the results were interpreted accordingly. As the validity of the multinomial logistic regression model was examined with the Odds Ratio Test, the model was found to be significant for χ^2=5061,79 and ($p < 0{,}05$) values. For each category of the models, it is seen that β coefficients take different values. Therefore, the odds ratios of variable for each category varies.

The effect of each independent variable on the dependent variable in the multinomial logistic regression model is different from each other for each category. While the effect of the independent variable in the logit that compares the first and third levels of the dependent variable was denoted with β_1, the effect of the independent variable in the logit that compares second and third levels of the dependent variable was denoted with β_2. Thus, the slopes, i.e. βs, in the multinomial logistic regression model constructed were different from each other. In the multinomial logistic regression model, the categories that include significant coefficients can be interpreted in terms of the how much they increase or decrease the odds ratios with respect to the third category, which was taken as the baseline category. The results of multinomial logistic regression analysis are given in Table 4 and Table 5

Table 4: Coefficient, Standard Error and Odds Ratio Estimates and *p*Values of the Multinomial Logistic Regression Model (Comparison for 1)

Comparison for the Work Status of Children	Variable/Level of Variable	Coefficient (β)	Standard Error	Odds Ratio (e^{β})	p value
Categorical comparison for "non-worker" vis-a-vis "those engaged in economic activity" (Comparison 1)	**Rural/Urban**				
	Threshold 1	-1.642	0.039	---	---
	Urban	-0.671	0.054	0.511	$p < 0{,}001$
	Gender				
	Threshold 1	-1.840	0.032	---	---
	Female	-0.565	0.058	0.567	$p < 0{,}001$
	Age group				
	Threshold 1	-3.052	0.046		
	15-17	2.483	0.060	11.978	$p < 0{,}001$
	Size of household				
	Threshold 1	-2.163	0.046	---	---
	5-6	0.188	0.062	1.207	$p < 0{,}001$
	7 or more	0.175	0.069	1.191	$p < 0{,}001$
	Literacy status				
	Threshold 1	-3.025	0.048	---	---
	No	-0.489	0.258	0.613	0.058
	Still learning	2.233	0.060	9.330	$p < 0{,}001$
	Status of Attendance to Formal Education				
	Threshold 1	-2.706	0.037	---	---
	No	3.038	0.066	20.875	$p < 0{,}001$
	Educational status of the householder (father or mother)				
	Threshold 1	-1.896	0.082	---	---
	Literate, no formal	0.236	0.125	1.266	0.060
	Primary school graduate	0.163	0.088	1.177	0.066
	Secondary school graduate	0.031	0.334	1.031	0.925
	Primary school graduate	-0.460	0.128	0.630	$p < 0{,}001$
	General high school	-1.081	0.167	0.339	$p < 0{,}001$
	Vocational high school	-0.879	0.161	0.414	$p < 0{,}001$
	Undergraduate	-2.308	0.245	0.099	$p < 0{,}001$

Categorical comparison for "non-worker" vis-a-vis "those engaged in economic activity" (Comparison 1)

- **Rural/Urban** The rural/urban distinction variable was significant among the factors that forced children to work. The probability of a child who lives in an urban area in Turkey to be engaged in economic

activity with respect to being a non-worker was 0.511 times lower than that of a child living in the countryside.

- **Gender** The gender variable was significant among factors that push children to work. The probability of girls to be engaged in economic activity with respect to being a non-worker was 0.567 times lower than boys.
- **Age Group** The age group variable was significant among factors that force children to work. The probability of a child between 15 and 17 years of age in Turkey to be engaged in economic activity with respect to being a non-worker was 11.978 times higher than that of a child between 6 and 14 years of age.
- **Size of Household** The size of household variable was significant among factors that force children to work. The probability of child who is a member of a household that has five to six members to be engaged in economic activity with respect to being a non-worker was 1.207 times higher than a child who has one to four members in her/his household. Similarly, the probability of child who is a member of a household that has seven or more members to be engaged in economic activity with respect to being a non-worker was 1.191 times higher than a child who has one to four members in her/his household.
- **Literacy status** The literacy status variable was significant among factors that force children to work. The probability of a child who is still learning how to read and write in Turkey to be engaged in economic activity with respect to being a non-worker was 9.330 times higher than a child who is literate.
- **Status of formal education attendance** The status of attendance to formal education variable was significant among factors that force children to work. The probability of a child who does not attend formal education in Turkey to be engaged in economic activity with respect to being a non-worker was 20.875 times higher than that of a child who attends formal education.
- **Educational status of the householder (father or mother)** The educational status of the householder variable was significant among factors that force children to work. The probability of a child whose mother or father is a primary school, general high school, vocational high school, or college graduate to be engaged in economic activity with respect to being a non-worker was 0.630, 0.339, 0.414, and 0.099 times lower, respectively, than a child whose mother or father is illiterate.

Table 5: Coefficient, Standard Error and Odds Ratio Estimates and *p*Values of the Multinomial Logistic Regression Model (Comparison for 2)

Comparison for the Work Status of Children	Variable/Level of Variable	Coefficient (β)	Standard Error	Odds Ratio (e^{β})	p value
Categorical comparison for "non-worker" vis-a-vis "those engaged in domestic work" (Comparison 2)	**Rural/Urban**				
	Threshold 1	-0.223	0.024	---	---
	Urban	0.461	0.028	1.586	$p < 0{,}001$
	Gender				
	Threshold 1	-	0.017	---	---
	Female	0.548	0.025	1.730	$p < 0{,}001$
	Age group				
	Threshold 1	-0.072	0.014		
	15-17	0.824	0.031	2.280	$p < 0{,}001$
	Size of household				
	Threshold 1	0.321	0.019	---	---
	5-6	-0.172	0.028	0.841	$p < 0{,}001$
	7 or more	-0.739	0.034	0.477	$p < 0{,}001$
	Literacy status				
	Threshold 1	-0.094	0.015	---	---
	No	-1.052	0.089	0.349	$p < 0{,}001$
	Still learning	0.822	0.028		$p < 0{,}001$
	Status of Attendance to Formal Education				
	Threshold 1	0.091	0.012	---	---
	No	0.365	0.055	1.441	$p < 0{,}001$
	Educational status of the householder (father or mother)				
	Threshold 1	-0.348	0.046	---	---
	Literate, no formal	0.201	0.072	1.223	$p <$
	Primary school graduate	0.491	0.049	1.634	$p < 0{,}001$
	Secondary school	0.492	0.168	1.873	$p <$
	Primary school graduate	0.627	0.059	1.694	$p < 0{,}001$
	General high school	0.527	0.063	1.836	$p < 0{,}001$
	Vocational high school	0.608	0.064	1.599	$p < 0{,}001$
	Undergraduate	0.469	0.060	1.047	$p < 0{,}001$

Categorical comparison for "non-worker" vis-a-vis "those engaged in domestic work" (Comparison 2)

- **Rural/Urban** The rural/urban distinction variable was significant among the factors that forced children to work. The probability of a child who lives in an urban area in Turkey to be engaged in domestic work with respect to being a non-worker was 1.586 times higher than that of a child living in the countryside.
- **Gender** The gender variable was significant among factors that push children to work. The probability of girls to be engaged in domestic work with respect to being a non-worker was 1.730 times higher than boys.
- **Age Group** The age group variable was significant among factors that force children to work. The probability of a child between 15 and 17 years of age in Turkey to be engaged in domestic work with respect to being a non-worker was 2.280 times higher than that of a child between 6 and 14 years of age.
- **Size of Household** The size of household variable was significant among factors that force children to work. The probability of child who is a member of a household that has five to six members to be engaged in domestic work with respect to being a non-worker was 0.841 times higher than a child who has one to four members in her/his household. The probability of child who is a member of a household that has seven or more members to be engaged in domestic work with respect to being a non-worker was 0.477 times higher than a child who has one to four members in her/his household.
- **Literacy status** The literacy status variable was significant among factors that force children to work. The probability of an illiterate child in Turkey to be engaged in domestic work with respect to being a non-worker was 0.349 times higher than that of a child who is literate. On the contrary, the probability of a child who is still learning how to read and write to be engaged in domestic work with respect to being a non-worker was 2.275 higher than a child who is literate.
- **Status of formal education attendance** The status of attendance to formal education variable was significant among factors that force children to work. The probability of a child who does not attend formal education in Turkey to be engaged in domestic work with respect to being a non-worker was 1.441 times higher than that of a child who attends to formal education.

- **Educational status of the householder (father or mother)** The educational status of the householder variable was significant among factors that force children to work. The probability of a child whose mother or father is literate, a primary school, secondary school, or elementary school graduate to be engaged in domestic work with respect to being a non-worker was 1.223, 1.634, 1.873, and 1.694 times higher, respectively, than a child whose mother or father is illiterate. Similarly, the probability of a child whose mother or father is a general high school, vocational high school, or college graduate to be engaged in domestic work with respect to being a non-worker was 1.836, 1.599, and 1.047 times higher, respectively, than a child whose mother or father is illiterate.

4. Conclusion

The main purpose of this study was to reveal the relationship between children's work status and demographic characteristics using multinomial logistic regression. There are few studies in the literature that statistically establish the relationship between work status and demographic characteristics of children. Hence, we believe that evaluating child labour, which is significant psychologically, sociologically, and socially, with a statistical perspective adds a different dimension to the current literature.

Examining the comparisons between categories in the study, the odds values of coefficients concerning urban/rural, gender, age group, household size, literacy status, formal education attendance, and the educational status of the householder (mother or father) for both Comparison 1 and Comparison 2 were statistically significant.

Considering comparison 1 of the study, taking the status of being a non-worker as baseline category, it was determined that a child living in an urban area is less likely to be engaged in economic activity than a child living in the countryside, while the same is true for girls with respect to boys. It was also identified that a child between 15 and 17 years of age is more likely to be engaged in economic activity than a child between 6 and 14 years of age. Moreover, the probability of a child who has five to six, or seven or more members in her/his household to be engaged in economic activity is higher than a child who has one to four members in her/his household. Furthermore, the probability of a child who is still learning how to read and write to be engaged in economic activity is higher than a child who is illiterate in Turkey. It was revealed that the probability of a child who does not attend formal education to be engaged in economic activity is higher than that of a child who attends formal education. It was identified that the probability of a child whose mother or father is an elementary school, general high school,

vocational high school, or college graduate to be engaged in economic activity is lower than a child whose mother or father is illiterate.

Considering comparison 2 of the study, taking the status of being a non-worker as the baseline category, it was determined that a child living in an urban area is less likely to be engaged in domestic work than a child living in the countryside, while the same is true for girls with respect to boys. It was also identified that a child between 15 and 17 years of age is more likely to be engaged in domestic work than a child between 6 and 14 years of age. Moreover, the probability of a child who has five to six, or seven or more members in her/his household to be engaged in domestic work is higher than a child who has one to four members in her/his household. It was concluded that the probability of an illiterate child to be engaged in domestic work is lower than that of a child who is literate, whereas the probability of a child who is still learning how to read and write to be engaged in domestic work is higher than a literate child in Turkey. It was revealed that the probability of a child who does not attend formal education to be engaged in domestic work is higher than that of a child who attends formal education. The probability of a child whose mother or father is literate, or a primary school, secondary school, or elementary school graduate to be engaged in domestic work is lower than a child whose mother or father is illiterate.

This study has many limitations, which should be addressed in prospective studies. In prospective studies, much more comprehensive models can be built adding new factors to the model. Transforming the dependent variable into an ordered categorical structure, ordered logit models can be applied to the subject matter, which can be contrasted with multinomial logit models for goodness of fit. The correlation between political instruments suggested by the government and the factors that push children to work can be studied as well.

References

Ağacabay, M. (2012). "Çocuk ve Çocuk İşçiliği Kavramları". *Eğitişim Dergisi, Issue: 33.* Access link: www.egitisim.gen.tr Access date: 10.12.2015

Boukhari, Construir Futuro, inventir en la infancia: "Estudio economico de los costos ybeneficious de erradicar al trabojo en Iberoamerica". ILO, San Jose, Costa Rica, September 2005.

Fidan, F. (2004). "Çalışan Çocuk Olgusuna Sosyo-Psikolojik Bakış Sanayide Çalışan Çocuklar Örneği". *Trakya University Journal of Social Science*, 4(1): 30-49.

Günöz, M. (2007). "Türkiye'de Çocuk İşçi Sorunu Ve Çözüm Önerileri (Dissertation)". Republic of Turkey General Directorate of Labour and Social Security, Ankara.

Hosmer, D. W. and Lemeshow, S. (2000). *Introduction to the logistic regression model, in applied logistic regression, second ed*. John Wiley & Sons, Inc., Hoboken, NJ, USA.

Hosmer, D. W., Lemeshow, S., Sturdıvant, R. (2013). *Applied logistic regression*. Canada: Wiley & Sons Publication.

Kahramanaoğlu, E. (1996) *Türkiye'de Çalışan Çocuklar Sorunu ve Çözüm Yolları.* Kahramanoğlu, E. (ed) Hacettepe University Academy of Social Services and Friedrich–Nauman-Foundation Publication, Ankara.

Karaman, B. and Özçalık, M. (2007). "Türkiye'de Gelir Dağılım Eşitsizliğinin Bir Sonucu: Çocuk İşgücü". *Yönetim ve Ekonomi,* 14(1): 30-41.

Kayhan, N. (2012). "Çocuk İşçiliği, IPEC Deneyimi Işığında Sanayide Çalışan Çocukların Sorunları". *Hukuk ve İktisat Araştırmaları Dergisi,* 4(1): 187-200.

Kolk, A. and Tulder, R.V. (2002). "Child Labor and Multinational Conduct: A Comparison of Intarnational Business and Stakeholder Codes". *Journal of Business Ethics,* 36(3): 291-301.

Köksal, S. and Lordoğlu, K. (1993) *Geleneksel Çıraklıktan Çocuk Emeğine: Bir Alan Araştırması*. İstanbul: Friedrich Nauman Vakfı Yayınları.

Kleinbaum, D.G. and Klein M. (2010). *Logistic regression, a self-learning text, third edition*. Springer.

Liao, T.F.(1994). *Interpreting probability models. Logit, probit and other generalized linear models. Quantitative Applications in the Social Sciences.* Sage Publications.

Long, S. and Freese J. (2006). *Regression models for categorical dependent variables using STATA, second edition.* College Station, TX: Stata Press.

Tor, H. (2010). "Türkiye'de Çocuk İşçiliğinin Boyutları". *Zeitschrift für die Welt der Türken (ZfWT),* 2(2): 35-39.

"Republic of Turkey General Directorate of Labour and Social Security-Statistics". Access link:

http://www.csgb.gov.tr/csgbPortal/cgm.portal?page=cc&id=3. Access date: 15.12.2015.

Washıngton, S., Karlaftıs, M., Mannering, F. (2003). *Statistical and econometric models for transportation data analysis.* Boca Raton FL.:CRC Press.