

The causal effect of education on poverty: evidence from Turkey

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Abstract

This paper uses cross sectional survey data to explore the two-way causality between the household head's education level and poverty in Turkey. In contrast with the existing studies, this is the first study to examine the issue of a possible endogeneity problem. For that purpose and to overcome the simultaneity bias, we adopt the most commonly used Instrumental Variable (IV) estimation technique, two-stage least squares (2SLS) regression. Our IV estimates indicate that the policy reform, which was implemented in 1961, only increases the household head's years of education for rural residents. Furthermore, the higher the level of education of the household head, the higher the household per capita income. Policy recommendations for policymakers are addressed in the conclusion.

Keywords: poverty, education, income, instrumental variable, Turkey

Introduction

Since poverty is a multifaceted concept involving economic, social, and political elements, there is no unique definition for it. The concept of poverty differs from country to country depending on the level of development and on how it is viewed by people. The United Nations (1998) identifies it as "... the inability of getting choices and opportunities, a violation of human dignity" (UN Statement, June 1998, signed by the heads of all UN agencies) whereas the World Bank (2000) defines poverty as: "poverty is pronounced deprivation in well-being and comprises many dimensions" (World Bank, 2000, p. 15). In the existing literature, poverty is measured by various methods such as the absolute poverty approach, the relative poverty approach, and the subjective poverty approach.

Poverty poses challenges to education since lower levels of educational attainment are typical of students raised in poverty. Insufficient funding, weak

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parental support, and high turnover rates in teachers support the evidence that students with financial difficulties tend to have lower academic achievements. These factors are shown to be a result of inadequate school resources and lower opportunities for teachers' professional development that cause lower academic achievements among high concentrations of poor students (Blazer and Romanik, 2009). Therefore, poverty deprives children of the choice of educational opportunities and reduces educational outcomes (Coley and Baker, 2013).

There has been ongoing debate about the links between poverty and the level of education. Poverty and educational attainment are closely intertwined. Investment in education reduces the risk of poverty through enhancing the wages or income, as well as people's productivity. In addition, education allows people to obtain some necessary skills, which promote their capacity to produce more effectively. On the other hand, poverty limits the quality of education and equal access to education by affecting students' resources (Chaudhry and Rahman, 2009). As a result, poverty and education are inversely related to each other.

In this paper, we contribute to the existing literature on poverty by ascertaining the causal impact of education levels of household heads on the poverty risk of household in Turkey. In contrast with the existing studies in different periods and countries such as Awan 2008, Kızılgöl and Ucdogruk (2011), Bilenkişi *et al.* (2015), this study takes the endogeneity problem into account. The endogeneity problem occurs when the error term in a regression model is not only associated with the dependent variable but also with the independent variable, which may cause inconsistent and biased OLS results. To deal with the endogeneity problem, the method of instrumental variable (IV) has been used in this study.

This paper unfolds as follows. The next section presents the previous literature about the relationship between education and poverty. Section 2 discusses the potential endogeneity problem. Section 3 describes data, provides definitions of the main constructed variables and presents results of descriptive statistics. Section 4 discusses the estimation strategy used in this study. The main findings are presented in Section 5. Last section summarizes the main conclusions and suggests policy recommendations.

1. Literature review

Education plays an important role in combating poverty as it prepares poor people for the competitive labor market (Blustein, Kenny and Kozan, 2014). Graduates are able to lead productive lives since education aims to equalize economic opportunity in the country by offering a route out of poverty for the disadvantaged (Coley and Baker, 2013; Raffo *et al.*, 2007). Educational initiatives, which mean to close the poverty achievement gap by providing student assessments, face obstacles linked to accountability for student achievement without controlling

all the factors. Therefore, educational institutions are incapable of eliminating inequalities completely (Blazer and Romanik, 2009; Lacour and Tissington, 2011).

Numerous studies have been performed on the direct impact of poverty on education. These studies often lack economic theory, relying instead take on an ad hoc approach. Black *et al.* (2013) argue that outcomes for children aged 4 to 15 are directly proportional to parents' income and also that cognition is negatively affected by lower income. For example, parents from poor backgrounds are likely to give birth to premature children and the premature children are at higher risks of failure in school as compared to those born in middle or higher income families.

Educating a girl child is said by some to be the first step to eliminating poverty in a nation. Burnett and Lampert (2015) argue that educating girls on their rights concerning marriage and responsive health care empowers them, improving their decision making towards early pregnancies that can terminate their education process. The problem is that poverty makes it hard for these girls to get that knowledge, leading to most of them dropping out of school. Similarly, Mihai *et al.* (2015) found that when girls stay longer in school, it lowers the chances of early marriages. Staying longer in an educational environment improves their success rates of being rewarded with good jobs after school. They also added for developing nations with high levels of poverty, these girls may leave school and fail to get jobs since the government is not in a position of employing all the graduates.

A study by Rolleston (2011) investigated the linkage between school attendance, welfare and poverty in Ghana over the period 1991-2006 by using the Ghana Living Standards Surveys. This case study found that increased educational access plays an important role in determining household welfare. Awan *et al.* (2008) found that experience and educational outcome are important factors against poverty in Pakistan. In other words, highly educated people are less likely to be non-poor. Lastly, Burn and Childs (2016) reported that poverty is associated with the learning environment. Students from well-developed urban areas will be in a better position to access good quality education and an organized infrastructure as compared to those from less developed areas. In a well-structured environment, studies show that, other than academics, activities such as soccer and swimming games improve students' concentration and reading during class time. However, quite typically, only institutions in areas where most of the population is above the poverty line will afford these services.

The literature on the association between poverty and education in Turkey is limited and these studies do not take the endogeneity problem into account. For example, Kızılgöl and Ucdogruk (2011) investigate the link between poverty and household living standards by using the Household Budget Surveys over the period from 2002-2006 by applying the Heckman selection model. In this study, they find that the probability of falling into poverty decreases with the household head's education. In other words, the higher the education of the head, the higher the household welfare.

Finally, Bilenkisi, Gungor and Tapsin (2015) apply logistic regression models to analyze the effect of the household head's educational attainment on poverty risk. Their empirical findings highlight that there is a negative relationship between the head's of the household education level and the risk of poverty. Household poverty is higher among female headed households compared to male-headed households because of their low education.

2. Educational expansion in Turkey as the instrumental variable

There are numerous explanations for why education may be endogenous to poverty, among them the idea that a proper investment in educational attainment in early life may have a consequence on both poverty in later life and further education in the future. Additionally, other variables such as social activities away from school, the child's ability, the background of a person's family as well as time preferences may concurrently influence poverty and education (Engle and Black, 2008). At the same time, just as there may be reverse causality resulting from education to poverty, there may equally be a causality from poverty to education. For example, investment in education reduces poverty through enhancing the wages or income as well as people's productivity. In addition, education allows people to obtain some necessary skills which promote their capacity to produce more effectively. On the other hand, poverty limits the quality of education and equal access to education by affecting the resources to students (Chaudhry and Rahman, 2009). Since there is a causal relationship between the educational outcomes and the risk of poverty, we consider that two education reforms are used as an instrument for education.

The first instrument is the Turkish educational reform carried out in 1960s. This instrument is similar to the one used by Tansel and Karaoglan (2016) for their analysis of health and education in Turkey. In the early 1960s, the Turkish government made numerous changes in the educational sector. For instance, in January, 1961, there was a law passed that increased the mandatory schooling program from three to five years in the villages (Erdogan, 2003; Şen, 2013). Additionally, in 1960, a law allowed the graduates from middle schools to teach in primary schools, while the higher graduates would teach in middle schools after successfully completing teaching training courses. Consequently, these new laws increased the number of teachers and schools in the country (Akyuz, 1999). Following Tansel and Karaoglan (2016), we calculate the average years of schooling based on the Ministry of Education statistics¹. If a household head was born in 1952 or later, the years of schooling is equal to 5. Thus, the instrumental variable,

¹ The average years of schooling for primary school graduates prior to 1952 is calculated as a weighted average of three and five years of schooling where the weights are the number of rural and urban primary school graduates, respectively (Tansel and Karaoglan, 2016).

*Reform*1961, takes the value of one if the household head was born in 1952 or later, and it is zero if the household head was born before 1952.

The second instrument is constructed based on the 1997 Compulsory Schooling reform. The Turkish parliament passed a law in 1997 to increase the mandatory years of schooling from 5 to 8 years. Exposure to this reform is used as an instrument for completed schooling to analyze the effect of education on various poverty outcomes. The instrumental variable, *Reform*1997, takes the value of one if the household head was born after 1986, and it is zero if the household head was born before 1986. However, it is uncertain whether those who were born in 1986 were exposed to the reform because of the education system in Turkey. Table 1 shows the instrumental variables used for the 2SLS estimator.

Table 1. The structure of instruments used in the model

	1961 Schooling Program		1997 Schooling Program	
	Birth Year		Birth Year	
	Before 1952	After 1952	Before 1986	After 1986
	3 years	5 years	5 years	8 years

Source: authors' representation

3. Data and variables

3.1. Data

To analyze the impact of education attainment on poverty, this study uses cross-sectional data obtained from the Turkish Statistical Institute's (TURKSTAT) Income and Living Conditions Survey (hereafter, ILCS) which was conducted in 2013. The ILCS is a nationally representative survey repeated every year. The purpose of the survey is to monitor the indicators on income distribution, poverty, social exclusion, labor status, demographical characteristics, educational and health status of household members. The original sample consists of 19,899 households, 6,671 of which were from rural areas and 13,228 of which were from urban areas. The survey covers the entire country and the target population comprises all persons residing within the borders of the republic of Turkey. The survey excludes the population institutionalized in dormitories, guesthouses, childcare centers, orphanages, nursing homes, private hospitals, prisons, and military barracks.

3.2. Dependent variable

Our objective is to identify the linkages between household characteristics and poverty. The key outcome variable, *poverty*, is constructed based on the "relative

poverty approach” which is proposed by the OECD. The relative poverty approach takes into account the net total disposable income of each household to generate a specific poverty line for the sample, using 50-percent of the median of per capita net equivalence disposable income. Then, the calculated poverty line allows us to compare each household’s net total disposable income level². Specifically, the poverty line for the sample has been computed as follows:

(i) Calculating the equivalence scale to compare households with different structures. According to the OECD (2008), the equivalence scale³ (also known as ‘modified- OECD equivalence scale’) can be derived for each household by using the following equation:

$$a_i = 1 + (N_i^{Adult} - 1) * 0.5 + (N_i^{Child}) * 0.3 \quad (1)$$

where a_i denotes the i^{th} household’s equivalence scale, N_i^{Adult} refers to the number of adults older than or equal to 14 years old who live in the i^{th} household, N_i^{Child} states the number of children younger than 14 years old who live in the i^{th} household.

(ii) After computing each household’s equivalence scale, the next step is to find each household’s per capita equivalence disposable income (Y_i) by dividing each household’s net total disposable income (D_i) by the computed equivalence scale.

$$Y_i = \frac{D_i}{a_i} \quad (2)$$

(iii) The last step is to find the poverty line by taking fifty-percent of the median household per equivalence disposable income set. The poverty line is written as:

$$Poverty\ line = \{median\ of\ (Y_1, Y_2, \dots, Y_i)\} * 0.50 \quad (3)$$

Following these calculations, the dependent variable in the logistic regression analysis is determined as follows: If a head’s of household per equivalence disposable income is less than the calculated relative poverty line, the variable is coded 1 which indicates *poor* households, otherwise *non-poor*.

A person’s prosperity is defined not only by the goods that they can afford, but also by comparison to what other members of society can afford. The comparison of what people can afford with regards to what other people can be expected to afford is made through the relative poverty analysis (Iceland, 2005). To find whether a person is relatively poor, their well-being is compared to the objective measure

² The net total disposable income level is calculated as the total of individual disposable income of all members of the households, adding the total of yearly income for the household and subtracting taxes paid during the reference period of income and regular transfers to the other households or persons.

³ The OECD equivalence scale method, first proposed by Haagenars *et al.* (1994), assigns a value of 1 to the first household member, of 0.5 to each additional adult and of 0.3 to each child.

determined by the researcher – the average standard of living. According to Alcock (1998), the relative poverty requires value judgment to determine whether one is poor compared to others and, thus, is subjective.

Relative poverty concerns the economic status of a person compared to other society members. It shows whether a person lacks consumption, income, housing of appropriate quality, clothing, and other material possessions compared to others (Iceland, 2005). The relative poverty line is determined in each region considering the distribution of consumption, income, housing, or material possessions in this region. According to Woolard and Leibbrandt (1999), for developed countries, the relative poverty line should be established at half of the country's average consumption, income, or other characteristics mentioned above. Accordingly, those who fall below this line are classified as relatively poor and those who fall above this line enter the “not poor” category.

Relative poverty is often criticized for its consideration only of the objectively set consumption and income levels. However, those who fall into the category “poor” may actually not feel poor, while those falling into the “not poor” category may, in fact, feel poor.

3.3. Estimation strategy

As we mentioned above, we adopt the IV-probit model to analyze the causal effect of education on poverty. IV regression is a powerful tool to analyze causal effects. In practice, finding a good instrument is the most difficult aspect of IV estimation. Using invalid instruments produces meaningless results. It is, therefore, important to assess whether a given set of instruments is valid in an econometric model. If the instruments are weak, then the normal distribution provides a poor approximation to the sampling distribution of the Two Stage Least Squares (TSLS) estimator, even if the sample size is large. In fact, if instruments are weak, then the TSLS estimator can be badly biased in the direction of the OLS estimator. That is, the TSLS is no longer reliable in the case of weak instrument. To test an instrument is ‘reliable’, we use the first-stage F-statistic, which is testing the hypothesis that the coefficients on the instruments equal to zero in the first-stage of the TSLS. In the case of one instrument and one endogenous regressor, if the F-statistics from the first-stage regression exceeds 10, we have sufficiently strong instrument for the case of exactly-identified case (Stock and Watson, 2011).

In this study, to identify the causal impact of education, we use two different education reforms, enacted in 1961 and 1997, which increased the compulsory years of schooling from 3 to 5 and from 5 to 8, respectively. To address the endogeneity of educational attainment, we estimate a IV-probit model depicted by Equation (4) below:

$$Pov_i = \beta_0 + \beta_1 Educ_i + X_i \delta + \varepsilon_i \quad (4)$$

where the variable Pov_i has two different outcomes. First, it is a continuous variable, defined as the natural logarithm of the per capita relative income. Second, it is a binary variable and denotes whether the household's per equivalence disposable income is below the calculated poverty line or not. Therefore, in this case, 1 indicates that the head of the household is poor and 0 indicates otherwise. $Educ_i$ is an indicator to state the years of schooling of the household's head. The vector, X_i , stands for the personal characteristics of the household head, including age, gender, marital status, and employment status. Equation (5) is the expression of the second-stage regression in the IV-probit model.

Since poverty and educational attainment are closely intertwined, estimating equation (5) by Ordinary Least Square (OLS) could lead to biased results because of unobserved determinants that may affect the risk of poverty. Alternatively, reverse causality may exist and poverty may influence the level of education attainment. To solve the endogeneity of educational attainment, we use different Education Reforms implemented in Turkey as an instrument. The second-stage of the IV-probit model can be expressed as follow:

$$Educ_i = \alpha_0 + \alpha_1 EducationalReform_i + X_i\vartheta + \mu_i \quad (5)$$

where *EducationalReform* is a dummy variable that indicates whether the household head was affected by the reform or not.

4. Empirical results

4.1. Summary statistics

To avoid the problem of perfect multicollinearity, one classification is dropped from each group of variables for estimation purposes. Table 1 and Table 2 provide the choice of explanatory variables and their summary statistics, respectively. On average, 15% of the individuals in the rural area are female whereas it is 16% in the urban area.

Age measures the age of the individuals of the sample. To test nonlinearity between income and age, we also introduce the variable *age squared* (Age^2). The average age in the rural area is 53 years old and 47 years old in the urban area.

Marital status is measured by three dummies indicating whether the individual is married (Married), has never married (Single), has divorced or separated or widowed (Divorced–Widowed–Separated). In the urban area sample, 81% of the individuals are married, 4% of the individuals are single (never married), and 15% of the individuals are divorced or widowed or separated. The corresponding numbers for the urban area are 81%, 3%, and 16%.

We define four dummies to control for individuals' labor market status. In the urban sample, 63% of the individuals are working, 4% are unemployed, 13% are retired, 20% are inactive in the labor force. The labor market structure in the urban

area tends to be quite similar to the one in the rural area. In addition, in the rural area sample, 28% of the individuals are illiterate, 52% have completed primary school, 8% have completed secondary school, 7% have completed high school and 5% have university studies.

Table 1. Explanatory variables used in the empirical analysis

Variables	Type	Description
Dependent Variables		
Poverty incidence	Dummy	Poverty status; 1 =poor, 0 =non-poor
Relative income	Continuous	Log of relative income
Explanatory variables		
Female	Dummy	1 = Household head is female, 0 = otherwise
Household head's age	Continuous	Age of household head (in years)
Age-squared	Continuous	Age squared
Never Married	Dummy	1 = Never married, 0 = otherwise
Married	Dummy	1 = Married, 0 = otherwise
Div./Wid./Sep.	Dummy	1 = Divorced/Widowed/Separated, 0 = otherwise
No education	Dummy	1 = Household head with none education, 0 = otherwise
Primary school	Dummy	1 = Household head with primary education, 0 = otherwise
Middle school	Dummy	1 = Household head with middle education, 0 = otherwise
High school	Dummy	1 = Household head with high education, 0 = otherwise
College +	Dummy	1 = Household head with college and above, 0 = otherwise
Working	Dummy	1 = Household head is working, 0 = otherwise
Unemployed	Dummy	1 = Household head is unemployed, 0 = otherwise
Retired	Dummy	1 = Household head is retired, 0 = otherwise
Inactive	Dummy	1 = Household head is inactive, 0 = otherwise

Source: authors' representation

Table 2. Summary statistics of the variables employed in regression

Explanatory Variables	Rural				Urban			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Poverty incidence	0.14	0.35	0	1	0.13	0.34	0	1
Relative income	8.99	0.651	4.02	11.95	9.40	0.69		
Social and Economic Variables								
Female	0.15	0.36	0	1	0.16	0.36	0	1
Age	53.54	15.56	16	93	47.49	14.65	15	110
Age Squared	3109.15	1721.35	256	8649	2470.36	1523.99	225	12100
Marital Status								
Married	0.81	0.39	0	1	0.81	0.38	0	1
Divorced/Widowed/Separated	0.16	0.37	0	1	0.14	0.35	0	1
Working Situation								
Working	0.63	0.48	0	1	0.63	0.48	0	1
Retired	0.13	0.34	0	1	0.19	0.34	0	1
Inactive	0.20	0.40	0	1	0.13	0.39	0	1

Educational Level								
Primary School	0.52	0.49	0	1	0.39	0.48	0	1
Middle School	0.08	0.27	0	1	0.11	0.32	0	1
High School	0.07	0.26	0	1	0.19	0.39	0	1
College +	0.05	0.21	0	1	0.17	0.38	0	1

Source: authors' representation

4.2. IV – probit estimation results

As discussed above, in the presence of endogeneity, the OLS procedure can generate biased and inconsistent estimators. In this study, before estimating IV-probit equations, one should decide whether it is necessary to use an instrumental variable to correct the endogeneity problem. In such case, the proper test is the Hausman specification test of endogeneity, which indicates whether or not one of the explanatory variables in a regression suffers from endogeneity. The findings show that the Hausman test's p-value is very small (0.0004), which determines that the OLS estimates are not consistent. Similarly, to deal with endogeneity in a binary dependent variable model, we also used Hausman test for decision. The test result shows that we have an endogeneity problem with education and poverty, with a p-value of (0.0000). To analyze the impact of different Turkish educational reforms on poverty, the years of schooling is instrumented with the policy reform (*Reform1961*) and (*Reform 1997*) dummy. In IV regression, we first focus on the reliability of the coefficient estimates that depend on the validity of the instruments by checking the diagnostic statistics. Table 3 reports the first-stage regression estimates of 2SLS model in the case of relative income.

Table 3. Effect of different educational reform on education: first-stage IV estimates

Dependent Variable: Years of Schooling									
		Rural (n=6,671)				Urban (13, 228)			
		(1)		(2)		(1)		(2)	
		First Stage		First Stage		First Stage		First Stage	
		Est.	t-stat	Est.	t-stat	Est.	t-stat	Est.	t-stat
Instrumented variable:									
Education									
Instrument: Educational Reform (Dummy)									
	Reform 1961	0.203	3.13			0.061	0.075		
	Reform 1997			-0.142	0.138			-0.031	0.15
		F-test of instruments		F-test of instruments		F-test of instruments		F-test of instruments	
		F-stat		F-stat		F-stat		F-stat	
		24.85 (0.000)		7.21 (0.370)		2.56 (0.152)		5.12 (0.138)	
No. of treated observations		4 314		122		10 486		469	

Notes: This table reports the results first-stage regression of 2SLS model in the case of relative income. We used as instruments Reform 1961 and Reform 1997. We report the results of first-stage estimate and joint F-test of significance of the instruments. p-values are reported in parentheses

Source: authors' representation

For the regression in column (1), (2), (3), and (4), the first-stage F-statistics are 24.85, 7.21, 2.56, and 5.12, respectively. Of these four, only one exceeds 10. We conclude that the instrument used for the rural area, which is the 1961 educational reform, is not weak, thus we can rely on the standard methods for statistical inference using the 2SLS coefficients and standard errors.

Similarly, Table 4 shows the first-stage regression estimates of the 2SLS model in the case of whether the household's per equivalence disposable income is below the calculated poverty line or not. Again, only the F-statistic value from first-stage regression for rural residents (15.88) is higher than 10, indicating that the 1961 educational reform is a sufficiently strong instrument.

Table 4. Effect of different educational reform on education: first-stage IV estimates

Dependent Variable: Years of Schooling									
		Rural (n=6,671)				Urban (13, 228)			
		(1)		(2)		(1)		(2)	
		First Stage		First Stage		First Stage		First Stage	
		Est.	t-stat	Est.	t-stat	Est.	t-stat	Est.	t-stat
Instrumented variable:									
Education									
Instrument: Educational Reform (Dummy)									
	Reform 1961	0.089	3.953			0.021	0.025		
	Reform 1997			-0.15	-3.16			-0.1096	-3.96
		F-test of instruments		F-test of instruments		F-test of instruments		F-test of instruments	
		F-stat		F-stat		F-stat		F-stat	
		15.88 (0.000)		5.65 (0.151)		1.24 (0.265)		8.69 (0.224)	
No. of treated observations		4 314		122		10 486		1 831	
No. of poor households		960						469	

Note: This table reports the results first-stage regression of 2SLS model in the log of probability of being poor. We used as instruments Reform 1961 and Reform 1997. We report the results of first-stage estimate and joint F-test of significance of the instruments. *p-values* are reported in parentheses.

Source: authors' representation

However, columns (1) of Table 3 and Table 4 demonstrate that the educational expansion increases the number of years of schooling by about 20 and 9 percent for rural residents. In other words, for a household head born in or after 1952, the impact of the educational expansion on the years of schooling is positive and significant at the one-percent level.

Table 5 and Table 6 display the second stage results from IV-probit estimation. From column (1) of Table 5, the results suggest that additional years of schooling have a significant positive impact on a household head's relative income, which means that additional years of schooling increase the head's of household residing in the rural area relative income by 7.3 percent. This is the line with what was expected. Table 5 also reports the impact of control variables on the relative income. The married or divorced dummy variable is statistically significant at 1%, indicating that being married and/or divorced decreases a household head's relative income by 33% and 25%, respectively. With respect to employment status, being employed or retired has a significant positive

effect on the relative income, whereas being inactive is not statistically different from zero. In addition, age and age-squared variables are statistically significant at 5%, and relative income increases at older ages.

Table 5. Effect of different educational reform on education: second-stage IV estimates

Dependent Variable: The log relative income								
	Rural				Urban			
	Second-Stage		Second-Stage		Second-Stage		Second-Stage	
	Est.	z-stat	Est.	z-stat	Est.	z-stat	Est.	z-stat
Years of Schooling	0.073*	(-1.94)	-1.66	(-1.52)	0.01	(0.01)	-0.05	(0.15)
Age	0.04**	(2.35)	0.08	(2.74)	0.019	(0.45)	0.01	(1.42)
Age-squared	-0.0003**	(-2.08)	-0.0007	(-2.59)	-0.0001	(-0.30)	-0.0001	(-0.89)
Female	0.07	(1.31)	-0.03	(-0.37)	0.22	(3.49)	0.23	(7.26)
Married	-0.33***	(-3.59)	-0.16	(-1.12)	-0.48	(-2.34)	-0.49	(-7.23)
Div./Wid./Sep.	-0.25***	(-3.02)	-0.13	(-1.09)	-0.39	(-2.06)	-0.39	(-6.01)
Employed	0.058***	(11.10)	0.59	(8.04)	0.67	(5.05)	0.67	(13.46)
Retired	0.067***	(11.22)	0.69	(8.28)	0.58	(9.55)	0.59	(14.84)
Inactive	-0.07	(-0.91)	-0.19	(-1.62)	0.06	(0.85)	0.06	(1.55)

Notes: This table reports the results second-stage regression of 2SLS model. The dependent variable is the log of relative income. We investigate the effect of years of schooling on relative income. *p-values* are reported in parentheses.

Source: authors' representation

Table 6. Effect of different educational reform on education: second-stage IV estimates

Dependent Variable: The probability of being poor								
	Rural				Urban			
	Second-Stage		Second-Stage		Second-Stage		Second-Stage	
	Est.	z-stat	Est.	z-stat	Est.	z-stat	Est.	z-stat
Years of Schooling	-0.18	(0.95)	0.74	(-1.23)	0.07	(0.12)	0.03	(0.99)
Age	-0.009	(-1.01)	-0.03	(-2.25)	-0.005	(-0.26)	-0.01	(-2.39)
Age-squared	-0.0006	(0.80)	0.0003	(2.13)	0.0003	(0.16)	0.0001	(2.06)
Female	0.05*	(-1.67)	0.01	(0.37)	-0.08	(-2.70)	-0.07	(-4.29)
Married	0.05	(1.18)	-0.04	(-0.62)	0.10	(1.03)	0.05	(1.53)
Div./Wid./Sep.	-0.01***	(-0.30)	-0.08	(-1.28)	0.06	(0.70)	0.01	(0.55)
Employed	-0.031***	(11.59)	-0.31	(-8.44)	-0.33	(-5.03)	-0.30	(-11.15)
Retired	-0.039***	(12.89)	-0.40	(-9.55)	-0.38	(-12.73)	-0.37	(-17.70)
Inactive	-0.007*	(-1.84)	0.003	(0.05)	-0.14	(-3.56)	-0.12	(-5.15)

Notes: This table reports the results second-stage regression of 2SLS model. The dependent variable is the probability of being poor. We investigate the effect of years of schooling on relative income. *z-statistics* are reported in parentheses.

Source: authors' representation

On the other hand, column (1) of Table 6 presents that additional years of schooling has a significant negative impact on the probability of being poor, but this impact is not statistically significant at any significance level. The coefficient on female is 0.05, indicating that female-headed households are more likely to be poor. Furthermore, all employment statuses are statistically significant, which implies that having a job or being retired or inactive reduces the likelihood of being poor by

3.1%, 3.9% and 0.7%, respectively. In addition, being divorced significantly falls the probability of being poor for rural residents.

Conclusions and recommendations

This paper is the first of its kind to use the IV-estimation technique to analyze the causal impact of educational attainment on poverty in Turkey. We measured the poverty level by using the relative poverty approach. In the relative poverty approach, we compute the relative poverty line to compare each household's net total disposable income. If a household head's per disposable income falls below the computed relative poverty line, it is then classified as a poor household head, otherwise not. Yet, the relative poverty approach has some shortcomings. First and foremost, because the poverty line is objectively determined by a researcher, some household heads who fall into the "poor" category may not actually feel poor, whereas those that are classified as "not poor" may actually feel poor. In such case, we have a continuous outcome for poverty. In this study, we have identified various factors, such as levels of education of the household head, gender of the household head, age of the household head, employment status of the household head, marital status of the household head as statistically significant determinants of the relative income and the probability of being poor.

To address the endogeneity problem, we instrument the educational level by using the Turkish educational reform, implemented in 1961. The findings reveal that the educational expansion increases years of schooling by about 20 and 9 percent for rural residents. Moreover, the results also suggest that additional years of schooling have a significant positive impact on a household head's relative income, which means that additional years of schooling increase the heads' of household who reside in the rural area relative income by 7.3 percent.

These findings have several important implications for policy development. First, policymakers may focus on the education of women. Because the education of women is the beginning of a process that results in the education of society as a whole, country-level development will be increased. The higher the level of a woman's education attainment, the higher the age of marriage and childbearing; thus, she becomes aware of family planning, which may further reduce population growth rate and level of poverty. In addition, the educated female workforce has more opportunities to find a place for themselves in working life. Secondly, policymakers may develop strategies to improve the quality of education that promotes children's access to education. The United Nations Educational, Scientific and Cultural Organization (UNESCO) defines education 'as a human right' and addresses several goals to provide the right of access to education such as provision of free and compulsory primary education; development of forms of secondary education available and accessible to everyone, and introduction of measures to provide free education and financial assistance in cases of need; provision of accessible educational

and vocational information and guidance, etc. (United Nations Children's Fund, 2007, p. 29). Third, policymakers may suggest some policies to solve the problem of equal access to educational opportunities, which is not always effectively guaranteed to all citizens of a society. In addition, providing equality in education reduces poverty and accelerates the development of a country. Finally, the government should increase its role in education.

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References

- Akyüz, Y. (1999), *Türk Eğitim Tarihi Başlangıçtan 1999'a (The History of Turkish Education from the Beginning until 1999)*, İstanbul: Alfa Yayınevi.
- Alcock, P. (1997), *Understanding Poverty*, Basingstoke: Palgrave Macmillan.
- Awan, M.S., Malik, N. and Sarwar, H. (2008), *Impact of education on poverty reduction*, EABR & TLC Conferences Proceedings Rothenburg, Germany.
- Black, R. E., Victora, C. G., Walker, S.P., Bhutta, Z. A., Christian, P., De Onis, M. and Uauy, R. (2013), Maternal and child undernutrition and overweight in low-income and middle-income countries, *The Lancet*, 382(9890), pp. 427-451.
- Blazer, C. and Romanik, D. (2009), The effect of poverty on student achievement, *Information Capsule: Research Services*, 0901, pp. 1-23.
- Bilenkisi, F., Gungor, M.S. and Tapsin, G. (2015), The Impact of Household Heads' Education Levels on the Poverty Risk: The Evidence from Turkey, *Educational Sciences: Theory and Practice*, 15(2), pp. 337-348.
- Blustein, D.L., Kenny, M.E. and Kozan, S. (2014), Education and work as human birthrights: Eradicating poverty through knowledge, innovation, and collaboration, in: United Nations Development Program (ed.), *Barriers to and opportunities for poverty reduction: Prospects for private sector led interventions*, İstanbul: UNDP İstanbul Center for Private Sector in Development, pp. 38-62.
- Burn, K. and Childs, A. (2016), Responding to poverty through education and teacher education initiatives: a critical evaluation of key trends in government policy in England 1997-2015, *Journal of Education for Teaching*, 42(4), pp. 387-403.
- Burnett, B. and Lampert, J. (2015), *Teacher education for high poverty schools*, Switzerland: Springer International Publishing.
- Chaudhry, I.S. and Rahman, S. (2009), The impact of gender inequality in education on rural poverty in Pakistan: An empirical analysis, *European Journal of Economics, Finance and Administrative Science*, 15(1), pp. 174-188.
- Coley, R.J. and Baker, B. (2013), *Poverty and education: Finding the way forward*, Princeton: ETS Center for Research on Human Capital and Education.

- Engle, P.L. and Black, M.M. (2008), The effect of Poverty on Child Development and Educational Outcomes, *Annals of the New York Academy of Sciences*, 1136, pp. 243–256 (retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/18579886>).
- Erdoğan, İ. (2003), *Yeni bir Binyıla Doğru Türk Eğitim Sistemi Sorunlar ve Çözümler (Towards the New Millennium the Turkish Educational System: Problems and Solutions)*, İstanbul: Sistem Yayıncılık.
- Hagenaars, A.J., De Vos, K. and Asghar Zaidi, M. (1994), *Poverty statistics in the late 1980s: Research based on micro-data*.
- Iceland, J. (2005), Measuring Poverty: Theoretical and Empirical Considerations, *Measurement: Interdisciplinary Research and Perspectives*, 3(4), pp. 199-235.
- Kızılgöl, Ö.A. and Ucdogruk, S. (2011), 2002-2006 yılları arasında Türkiye’de yaşam standartları ve yoksulluğa ilişkin mikro ekonometrik analizler, *Atatürk Üniversitesi İİBF Dergisi, Ekonometri ve İstatistik Sempozyumu Özel Sayısı*, 10, pp. 373-390.
- Lacour, M. and Tissington, L.D. (2011), The effects of poverty on academic achievement. *Educational Research and Reviews*, 6, pp. 522-527.
- Mihai, M., Titan, E. and Manea, D. (2015), Education and Poverty, *Procedia Economics and Finance*, 32, pp. 855-860.
- Raffo, C., Dyson, A., Gunter, H., Hall, D., Jones, L. and Kalambouka A. (2007), *Education and poverty: A critical review of theory, policy and practice*, York: Joseph Rowntree Foundation.
- Rolleston, C. (2011), Educational access and poverty reduction: The case of Ghana 1991–2006, *International Journal of Educational Development*, 31(4), pp. 338-349.
- Stock, J.H. and Watson, M.W. (2011), *Introduction to Econometrics*, Boston, MA: Addison – Wesley Longman.
- Su, B. and Heshmati, A. (2013), *Analysis of the determinants of income and income gap between urban and rural China*, IZA Discussion Paper No. 7162, Bonn: The Institute for the Study of Labor.
- Şen, A. (2013), *Osmanlı’dan Günümüze Eğitimde Modernleşme Çabaları (Modernization Attempts in Education from the Ottomans until Present)*, EKEV Akademi Dergisi, 17(57), pp. 477-492.
- Tansel, A. and Karaoğlu, D. (2016), *The Causal Effect of Education on Health Behaviors: Evidence from Turkey*, IZA Discussion Paper No. 10020, Bonn, The Institute for the Study of Labor.
- Turkish Statistical Institute (2013), *Turkey in Statistics 2013*, Ankara: Author.
- UNESCO (2007), *A Human rights-based approach to Education for All: a framework for the realization of children’s right to education and rights within education*, Paris, France: UNESCO (retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000154861>).
- Woolard, I. and Leibbrandt, M. (1999), *Measuring Poverty in South Africa*, DPRU Working Papers No. 99/33, Cape Town: Development Policy Research Unit (DPRU), University of Cape Town.
- World Bank (2000), *World Development Report 2000/2001: Attacking Poverty*, Washington, DC: World Bank.