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The effect of education expenditure on economic growth: The case of Turkey

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Abstract

The relationship between education expenses and economic growth is among the practical studies attracting high interest in Economics literature. In this study, a positive relationship between education expenses and economic growth was found in the Turkish economy for the period 1970-2012. Thus it appeared that education expenses in Turkey had a positive effect on economic growth positively. A greater allocation of resources on education expenses could make the Turkish economy more dynamic.

Keywords: Education expenses, economic growth, bounds test,Turkey;

1.Introduction

Education has a significant role in the development of countries. On one hand, it fulfills its function in providing qualitative and quantitative labour required in the development process, while on the other hand, with its production and dissemination of knowledge function, it encourages countries to follow and develop modern manufacturing technologies and to transfer them to the production process. The increase in labor productivity as the level of education increases affects the competitiveness of countries positively and facilitates openness. Differences in education level are one of the main reasons of economic performance differences between developed and developing countries.

As one of the most important components of human capital, improvements in educational status are the source of significant increases in individual earnings with the contributions to business life such as increasing productivity, and thus the wages and employment opportunities of the individuals, whereas the risk of unemployment is decreased. With these aspects, increasing the level of education stands out as an effective political instrument in the struggle against unemployment and poverty especially in developing countries.

The fact that education has important effects on economic growth today is accepted beyond argument. The studies to display the effect of education and education expenses on growth are highly important in Economics theory. There is a wide range of literature on this issue.

The effects of education expenses on economic growth in the Turkish economy for 1979-2012 are presented in this study. In this context, it is aimed to briefly review the literature of the relationship between education and

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education expenses and economic growth and to present the results of the econometric analysis, the theoretical framework of which is primarily featured.

2.Literature

Besides the importance of knowledge, competence and talent in the economy have been highlighted for a long time as interest in educational issues has increased and significant literature has been published on this issue. The importance of new technologies, and having the labour to transfer and use the technology in the production process, which is the main strategic issue, was understood in the 18th century.

There are several approaches to the relationship between education and education expenses and growth in literature. Among these, in the Neo-classical approach, economic growth is expressed with the human capital factor included in model and the role of human capital is highlighted in the process of income differences between countries and convergence (Gümüş, 2005:100). The main objective of the model is to explain the source of growth differences in different countries and at different times. The Neo-classical approach in the model is an instrument to estimate long-term growth trends consistently. Although the Neo-classical growth model, which was developed in the middle of the 20th century, is a headstone in economic analysis, it has not been sufficiently successful in differentiating the human and physical capital effects (Dahli, 2002:18).

With endogeneous technological development depending on human capital accumulation, the new growth theory decreased the restraints in the neo-classical growth model by accepting income according to scale (Dahlin, 2002:29). In the new endogeneous growth models, human resource is central to the growth process (McMahon, 1998:159). The relationship was expressed by Nelson and Pelps (1966), Lucas (1988), Becker, Murphy and Tamura (1990), Rebelo (1992), Mulligan and Sala-i Martin (1992) and Barro and Lee (1992). And it was with a human capital model, one of the forms of the new endogeneous growth model (Kaya, 2004:300).

In one of the pilot studies in education-economic growth literature, Barro expressed the existence of a strong positive relationship between education and economic growth (Barro, 1991:407-443). Barro and Sala-i Martin stated that access to the education variable, measured by the average time in secondary and high school, has a tendency to display a significant relationship with growth (Barro and Martin, 1995:431).

In spite of several studies expressing the relationship between education and economic growth, some studies have suggested that there is no significant relationship between these two variables. Griliches emphasizes that there is no relationship between education and economic growth with his sensational findings. Although it is claimed that these conflicting results are derived from the low data set quality and measurement errors, Griliches denies these claims. The absorption of the expansion in human capital by the public sector is indicated as the reason for this conflict in the study.

Hirsch and Sulis came to the conclusion that wealth and accumulation of human capital were an important determinant for growth in Italy. According to this, it is mentioned that human capital has an important and positive effect on growth in the sectors where human capital is widely used (Hirsch and Sulis, 2009:23). In Guatemala Loening, Rao and Singh expressed that human capital has significant and positive effects on growth (Loening, 2010).

Among the studies researching the causality relationship between education and economic growth in Turkey, Kar and Ağır (2003), Taban and Kar (2006: 159-181) and Beşkaya, Savaş and Şamiloğlu (2010: 43-62) concluded that education and economic growth made important mutual contributions. Afşar determined a causality relationship from education investments to economic growth and concluded that there was no inverse relationship. However, Genç and Değer and Berber determined that the relationship between human capital and income per capita changed according to the levels of education. For example, while there was two–way causality at primary school level, there was a one–way causality from human capital to income per capita. However, Telater and Terzi (2010:197-214) determined that there was a one-way positive causality from income per capita to the number of higher education graduates. So it is estimated that the increase in income per capita may cause an increase in the number of higher education graduates. In their study supporting the endogeneous growth theory Şimşek and Kadılar (2010:115-140) expressed that human capital accumulation supported long-term economic growth, while on the other hand, economic growth increased human capital accumulation. In their studies researching the relationship between education and economic growth, Çalışkan, Karabacak and Meçik (2013:29-48) found that there was a positive relationship between the student numbers in high and higher education levels and Gross Domestic Product.

3.Analysis

In our study including 1979-2012 periods annual data have been used and total two variables have been used.In the symbols used for the variables, *y* indicates the real gross domestic products (2000=100) and *edu* indicates the total expenses to the education variables are included to the analysis logaritmic. Variables has been obtained from The World Bank (World Bank,2013).

In this study the bounds test approach developed by Peseran et al. (2001) was utilized in order to search the effect of education expenses on economic growth. Bounds test can test the existence of cointegration relationship although the stationary level of the series. In addition, another adventage of bounds test approach is that the model estimation is possible with also the data including less observation (Narayan and Narayan, 2004). Before beginning the analysis some tests and transactions were carried out about the variables used in the study. First of all stationarity levels of series was searched by Augmentd Dickey Fuller test and unit root test was implemented.

3.1.Unit root test

In this study stationary levels of variables were analyzed by utilizing Dickey-Fuller (1979) test. According to Table 1 presenting Augmented Dickey Fuller (ADF) test results, all variables are not stationary in level value. When the first differences of series were taken, they became stationary. In other words, all series were determined as I(1).

Table 1: ADF Unit root test results

Variables	ADF Test	Variables	ADF Test	Critical Value		
				1%	**5%**	**10%**
y	-0,34[1]	*edu*	-0,17[1]	-3,64	-2,95	-2,61
Δy	-6,54[1]	*Δedu*	-5,75[1]	-3,64	-2,95	-2,61

Note: Δ symbol indicates that the first differences of variables were taken. The values in [ ] indicate the optimal lag length determined according to Akaike information criterion:AIC.

3.2. Cointegration analysis

Level value of many macroeconomical variables is not stationary. If there exists a cointegration relationship between series, in other words, series moves together in long term, we wil not see a false regression problem in the analysis with level values. (Peseran et al. 2001; Guajariti, 1999). However, dynamic behaviours of variables moving together in long-term period indicate some deviations (Enders, 1996). This is a main characteristic of cointegrated variables and it has a determining role on short-term dynamics. The dynamic model occurring with this process is called as error correction model (Enders, 1995).

First of all, an unrestricted error correction model (UECM) is established to implement the bounds test approach. The adapted form of this model is like this:

$$\Delta y_{t=}\alpha_0 + \sum_{i=1}^{m} \alpha_{1i}\Delta y_{t-i} + \sum_{i=0}^{m} \alpha_{2i}\Delta edu_{t-i} + \alpha_3 y_{t-1} + \alpha_4 edu_{t-1} + u_t \qquad (1)$$

here *m* expresses the optimum lag length, Δ indicates difference operator, u_t indicates the error term and the other abbreviated letters indicate the meanings in variable definitions. In order to test H_0 hypothesis, the calculated F statistics value was compared with the critical value taken from Peseran et al. (2001) in Table 2. These critical values were given for an independent variable and 10% of significance level.

Table 2: Bounds testing results

	k	F-stat.	Lower Bound	Upper Bound
Model with Constant	1	4,05	3,02	3,51
Model with Constant and Trend	1	5,93	4,04	4,78

Note: k, represents the number of independent variable. Critical values were taken from Table CI(ii) and CI(iii) in Peseran et al. (2001).

It is observed that F statistics calculated in the table is higher than the upper critical value.In this case H_0 hypothesis is rejected and it is concluded that there is a cointegration relationship between variables. Since the existence of cointegration relationship is determined by this way, the process for the estimation of Autoregressive Distributed Lag (ARDL) models began in order to search the long and short term relationships.

3.3. Long term analysis

ARDL model established in order ro study the long term relationship is defined like this:

$$y_{t=}\alpha_0 + \sum_{i=1}^{m} \alpha_{1i} y_{t-i} + \sum_{i=0}^{n} \alpha_{2i} edu_{t-i} + u_t \quad (2)$$

Here m and n are lag length and they are determined by using AIC. For constant model the long term ARDL (1.2) model was determined, but for constant and trend model the long term ARDL (1.1) model was determined. The diagnostic test results of the model shows that the estimation is successful.

The estimation results of long term ARDL models and long term coefficients calculated by depending on these results are presented in Table 3. According to Table 3, coefficient of education expenses in constant model is in statistically significant and interpretable level and it affected the economic growth positively in accordance with the theoretical expectations. A 1% of increase in education expenses increases the economic growth in 0.30% rates.This result is interpreted as an important evidence that education expenses has effects on growth. However, in constant and trend model the coefficient of education expenses is not statistically significant.

Table 3: Long term ARDL models estimation, coefficiets and Diagnosis Test

	Model with Constant ARDL (1.2)		**Model with Constant and Trend ARDL (1.1)**	
Variables	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**
edu	0,3011	2,5916*	-0,0300	-0,6345
c	20,032	-6,9783	26,110	26,847
Diagnosis Test				
R^2=0,99 Adj.R^2=0,99	χ^2_{BGAB}(2) =0,29(0,74)		R^2=0,99 Adj. R^2=0,99	χ^2_{BGAB}(2) =0,85(0,45)
F-stat.=2683,82(0,00)	χ^2_{WDV} =1,71(0.14) χ^2_{JBN} =1,11(0,57)		F-stat=1099,6(0,00)	χ^2_{WDV} =1,83(0.11) χ^2_{JBN} =1,83(0,11)
DW=1,66	χ^2_{RRMKH} (2)=0,09(0.76)		DW=1,63	χ^2_{RRMKH} (2)=0,04(0.82)

Note: Here $\chi^2_{BGAB,}$ $\chi^2_{WDV,}$ χ^2_{JBN} and χ^2_{RRMKH} are the statistics of Breusch-Godfrey successive dependency, heteroscedasticity, Jarque-Bera normality test and Ramsey model making error in turn. The values in paranthesis indicate p-possibility values. (*) they show the 1% of significance level.

3.4. Short term analysis

The short term relationship between variables was searched by ARDL error correction model based again on the bounds test approach. According to this, the adapted form of model to our study is like this:

$$\Delta y_{t=}\alpha_0 + \alpha_1 ec_{t-1} + \sum_{i=1}^{m} \alpha_{2i} \Delta y_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta edu_{t-i} + u_t \quad (3)$$

Here the term ec_{t-1} is the error correction term and it represents the one term lagged serie of error terms series obtained from long term relationship.Coefficient of this variable expresses how many of the short term deviations will improve in the next term. Negative sign of this coefficient shows the deviations in the series will get further from long term balance value, positive sign shows they will come closer to long term balance value. For short term bounds test constant and for constant and trend models ARDL (7.1) models were determined.

In Table 4 the estimation results for short term ARDL (7.1) models are presented. Diagnostic test results of model indicate that estimation results are successful.

Tablo 4: Short term ARDLerror correction model estimation and Diagnosis Test

Models	Error Correction Term	Coefficient	t-stat
Constant	EC_{t-1}	-0,0145	-1,3933
Constant and Trend	EC_{t-1}	-0.1078	-3.4460
Diagnosis Test			
R^2=0,84 Adj. R^2=0,83	$\chi^2_{BGAB}(2)$=0,30(0,74)	R^2=0,86 Adj.R^2=0,84	$\chi^2_{BGAB}(2)$=2,02(0,14)
F-stat=63,49(0,00)	χ^2_{WDV}=4,47(0.01) χ^2_{JBN}=1,27(0,52)	F-stat=69,95(0,00)	χ^2_{WDV}=2,50(0.09) χ^2_{JBN}=0,85(0,65)
DW=2,11	$\chi^2_{RRMKH}(1)$=2,29(0.03)	DW=2,18	$\chi^2_{RRMKH}(1)$=3,26(0.002)

Note: Here χ^2_{BGAB}, χ^2_{WDV}, χ^2_{JBN} and χ^2_{RRMKH} are the statistics of Breusch-Godfrey successive dependency, heteroscedasticity, Jarque-Bera normality test and Ramsey model making error in turn. The values in paranthesis indicate p-possibility values. 5% of significance level is based.

As can be followed from Table 4 coefficient of error correction term in both models is statistically significant and negative as expected.So the error correction term of the model works.In other words, the deviations occurred in short term between the the series moving together in long term disappear and the series converge to the long term balance value again.

4.Results and policy implications

The most important advantage of developed countries is that they have the capacity for the well educated and qualified labour keeping pace with the rapid changes in manufacturing process and producing high technology. The improvements in educational level affect the economic growth positively by increasing both the labour productivity and the capacity of knowledge production.

The performance of a country in development process is closely related with the effectiveness of educational system. Besides its several positive contributions in social,cultural and political areas, an effective education system increases the competitiveness and contributes to the economic growth by training the qualified labour and productivity increase in economical aspects.With this regard, poicy makers should primarily centre the mission of training qualified and productive labour to the fundamentals of education system. Making polices to increase the education expenses about the education levels from primary to higher education can be told that as a second advice for that.

In this study the relationship between education expenses and economic growth specially for Turkey in 1970-2012 periods was searched. As a parallel result with the studies in literature, it was found that there was a positive and significant relationship between education expenses and economic growth. More resource allocations on education especially on higher education which will have important contributions to the economic growth process of Turkey will have positive effects on the performance of Turkey economy by increasing the transfer opportunities of knowledge production and sharing and manufacturing process of universities.

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