THE ROLE OF EDUCATION AT ALL LEVELS IN ECONOMIC GROWTH: AN EMPIRICAL STUDY OF TURKISH CASE

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ÖZET

Bu çalışma, 1955-2002 yılları arasındaki dönemde farklı eğitim seviyelerinin Türkiye'nin ekonomik büyümesi üzerindeki etkisini belirlemek için birim kök, eşbütünleşme ve nedensellik testlerini incelemektedir. Ayrıca erkek ve kadın eğitimlerinin her katogori için ekonomik büyüme üzerindeki etkilerinin ayrı ayrı görülebilmesi için eğitimle ilgili veriler cinsiyete göre ayrılmıştır. Sonuçlar, hem erkek hem de kadınlar için, ilköğretim ve üniversite eğitimi seviyesinde eğitimin ekonomik büyüme üzerinde anlamlı ve negatif yönlü etkisi olduğunu; orta öğretim seviyesinde pozitif yönlü etkisi olduğunu göstermektedir. İlaveten, kadınların tüm seviyelerde eğitime erişiminin ekonomik büyüme üzerinde erkeklerinin aynı seviyelerde eğitime erişiminden daha yüksek etkisinin olduğu bulunmuştur.

Anahtar Kelimeler: Eğitim, Ekonomik Büyüme, Eşbütünleşme, Türkiye.

ABSTRACT

This paper explores a series of unit root, cointegration and causality test to identify the impact of different educational levels on economic growth in Turkey for the period 1955 to 2002. Further, the educational variables are broken down by gender to see separately the effect of female and male educations at each category on economic growth. Results reveal that education has a significant and negative effect on Turkish's economic growth in primary and university education level and positive effect on high school education both for women and men. In addition it is found that the effect of women's educational attainment at all levels has a higher impact on economic growth than men's educational attainment at same levels.

Key Words: Education, Economic growth, Cointegration, Turkey

INTRODUCTION

Evidence from a growing number of countries in all over the world demonstrates that education is a very important growth factor. More and better education is a requisite for rapid economic development around the world. Education increases an individual's earning potential, and also produces a "ripple effect" throughout the economy by way of a series of positive externalities such as increasing the efficiency of the labor force, fostering democracy and creating better conditions for good governance, and improving equality (Barro, 1997; Aghion et al., 1999; Gylfason, 2001; Petrakis and Stamatakis, 2002; Self and Grabowski, 2004). In addition, the level and distribution of educational attainment has a strong

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impact on social outcomes, such as child mortality, fertility, education of children and income distribution (Barro and Lee, 2001: 541).

The importance and effects of education on economic growth have been attracted noticeable attention both by policy makers and economist in Turkey recently. The governments committed itself to the goal of an expansion of educational opportunities at all levels (Coban, 2004). For instance, the 1997 law, which extended the duration of compulsory primary education from five to eight years. Tansel (2001) shows in her study that younger populations have been staying in school longer recently due to the effect of this law. In addition, in the name of the increase the number of higher education students many new universities were established; both state and private recently. For example, currently there are 72 universities both private and public in Turkey.

This study investigates the impact of education on growth in Turkey for the time period 1955 to 2002. Education is broken up into the categories of primary, high school, and university education. Using time series techniques we determine whether education at all levels has a casual impact on growth rate. Further, the educational variables are broken down by gender to see separately the effect of female and male educations at each category on economic growth.

This paper is organized as follows: Section two offers findings of earlier empirical studies conducted in both developed and developing countries including Turkey. Section three presents the data and methodology used. Section four explores the long-run relationship between educational variables and economic growth. Finally, Section five presents concluding remarks.

1.BACKGROUND

The literature is very rich related to the effect of education on economic growth in various countries both developed and developing ones. An attempt to review the general literature in depth is beyond the limited scope of this study. However, some studies are cited below. Various studies have generally demonstrated that there is a positive relationship between growth and education, although some recent works have questioned this link leading to some research into the reliability of some of the available aggregate evidence (Temple, 2001; Self and Grabowski, 2004). In addition, as is seen from the studies of Barro and Lee (1997) and Sachs and Warner (1995) there is even more limited and unclear empirical evidence linking the significance and relevance of different educational levels to the economic growth performance (Self and Grabowski, 2004). For instance, Barro and Lee, (1997) found a negative and insignificant impact of primary and tertiary education on economic growth.

On the other hand, the studies which have used cross-country data sets suggest that the relationship between growth and education varies as a result of different levels of economic development. Pasacharopoulos (1994) found that the educational effect of primary education was higher in less developed nations than in the developed ones. In same manner, Esim (1994) studied the effect of secondary

education to economic development in S.Korea, Malaysia, and Thailand which are in the developing stage, and found a significant and positive effect of secondary education on growth. In addition, recently, Petrakis and Stamatakis (2002) empirical findings claims that the role of primary and secondary education seems to be more important in less developed countries, while growth in OECD economies depends on higher education.

According to the Turkish empirical findings, consistent with prior findings in developing countries, suggest that education is a very important determinant of the economic growth. Kar and Taban (2003) examined the relationship between human capital as measured by educational expenditures and economic growth during the period 1971 to 2000 and they found that the causality issue between the variables is sensitive to the choice of the human capital measurement. Also, Canpolat (2000) investigated the effect of education on economic growth and claimed that the contribution of human capital to economic growth is around 40 percent and this indicates that returns to human capital investments are quite high. In same manner, Coban (2004) explored the relationship and interactions between human education and economic growth in Turkey for the period 1980-1997 and found that human capital has positively related to growth. More recently, Masatci (2004) explored using annual data for Turkey from 1955 to 2000 to find out whether there exists a cointegrating relationship between education as measured by enrollments rates in primary, secondary and higher education and the growth. He obtained that human capital has positive and significant impact on the growth. However, Gungor (1997) examined the effect of education on economic growth over the period 1980 to 1990 and obtained that the contribution of education to the growth is very low in the Turkish case (Gungor, 1997:185).

This paper differs from the previous Turkish empirical studies in some respects. As we mentioned above the paper examines a series of unit root, cointegration and causality test to identify the impact of different educational levels on economic growth in Turkey for the period 1955 to 2002. In addition, educational variables will be broken down by gender to find out whether the causal results vary by gender as is studied by Self and Grabowski (2004) for Indian case.

2.DATA, METHODOLOGY AND EMPIRICAL RESULTS

For this study we use annual data of the enrolment of female and male in primary school (FPRIM, MPRIM), in high school (FHIGH, MHIGH) and in university (FUNI, MUNI) and GDP (Gross Domestic Product) for the 1955-2002 period for Turkey. The data is taken from State Institute of Statistics of Turkey (SIS)[4]

All variables are transformed to natural logs and for females denoted as LGDP LFPRIM, LHIGH, LFUNI and for males LMPRIM, LMHIGH and LMUNI.

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[4] SIS, 2003, 2002 Statistical Yearbook of Turkey, The State Institute of Statistics, Ankara.

For the analysis of male and female labour force participation, following variables will be used:

LGDP= f(LFPRIM, LFHIGH, LFUNI)

LGDP= f(LMPRIM, LMHIGH, LMUNI)

The augmented Dickey Fuller (ADF) (Dickey and Fuller, 1979) test has been applied for examining unit roots and stationarity in this paper. When both series are integrated of the same order, we can proceed to test for the presence of cointegration. The Johansen maximum likelihood procedure (Johansen, 1988; Johansen and Juselius, 1990) is used for this purpose. Any long-run cointegrating relationship found between the series will contribute an additional error correction term to the ECM. The Johansen procedure is a vector autoregressive (VAR) based test on restrictions imposed by cointegration in the unrestricted VAR. The procedure suggested by Johansen (1988) basically depends on direct investigation of cointegration in the vector autoregressive (VAR) representation. This analysis yields maximum likelihood estimators of the unconstrained cointegration vectors, but it allows one to explicitly test for number of cointegration vectors.

Insert Table 1 here

Table 1 reports co-integration test results for at all levels of women education and economic growth. Both trace and maximum statistics indicates one cointegration vector. There is a long run relationship between women education and economic growth.

Insert Table 2 here

Table 2 shows co-integration test results for at all levels of men education and economic growth. Trace statistics and maximum statistics indicate one cointegration vector. There is a long run relationship between men education and economic growth as found as women's results.

An impulse response function traces the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables. A shock to the *i* th variable directly affects the *i* th variable, and is also transmitted to all of the endogenous variables though the dynamic structure of the VAR.

The results of the impulse- response functions, which showed the effects of one standard deviation shocks to the innovations in current and futures values of endogenous variables, are investigated for the 20 step a head years. Impulse response function results show that for women; a shock given female education

positively effects economic growth and the effect of the shock is permanent. The shock given male education positively affects growth as is seen as women's result. Lastly a shock given growth positively affects male education but the effect of shock is insignificant. A shock given growth negatively effects female education but in short run the effect of shock has finished. These empirical findings also suggest that women cannot benefit from opportunities of economic developments as men's gain as is pointed out in studies of Boserup (1970) and Erturk (1996).

Insert Figure 1 here

CONCLUSION

This study has investigated a series of unit root, cointegration and causality test to identify the relationship between the education levels on economic growth. Moreover, the information on co-integration in variables is taken into consideration in specifying the long- run relations among variables. In addition, the educational variables are disaggregated by gender to see the effect of female and male educations at each category on economic growth over the last 47 years.

Our empirical results reveal that education has a significant and negative effect on Turkish's economic growth in primary and university education level and positive effect on high school education both for women and men. In addition it is found that the effect of women's educational attainment at all levels has a higher impact on economic growth than men's educational attainment at same levels which is consistent with the findings of micro level studies from Turkey and other countries as well. This strong relationship between education and female participation rates shows that policy makers should concentrate on increasing women's education as suggested by Tansel (2002).

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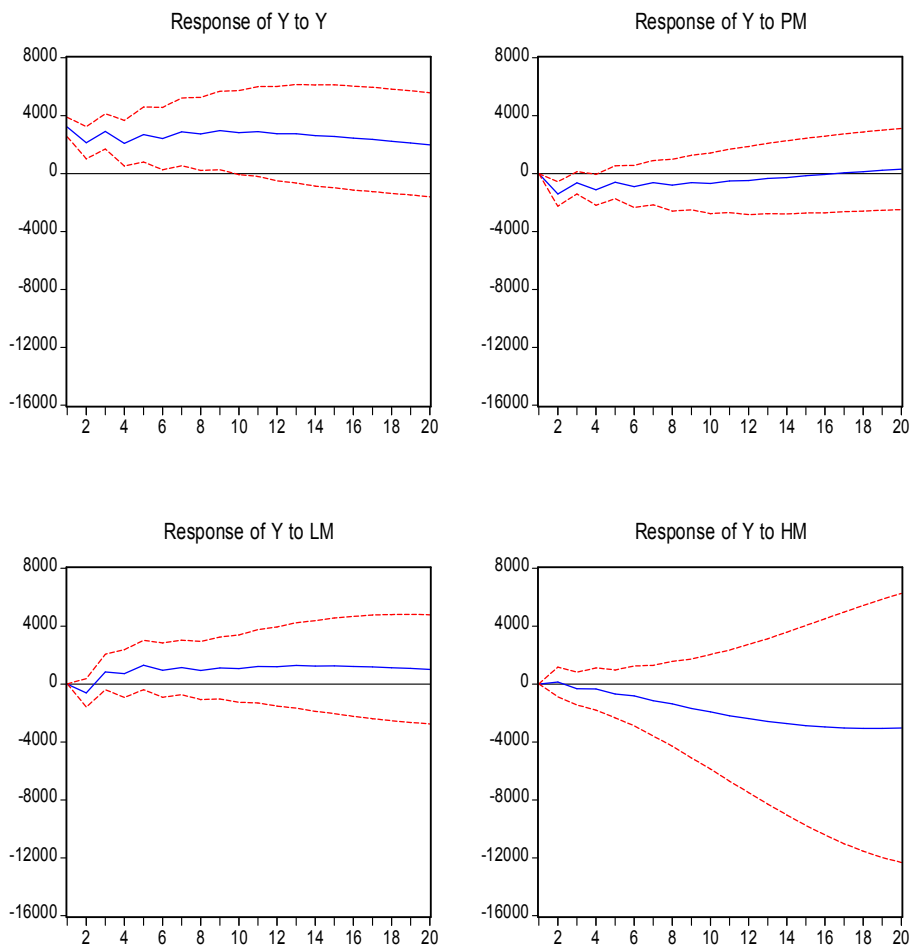
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Table 1. Johansen and Juselius Cointegration Test for Women				
Cointegration Rank	**Trace Statistics**		**Max Statistics**	
	Critic Values	%5 Significance Level	Critic Values	%5 Significance Level
None*	58.173	47.85613	28.57374	27.58434
At most 1	29.599	29.79707	19.25823	21.13162
At most 2	10.341	15.49471	8.983424	14.26460
At most 3	1.357	3.841466	1.357845	3.841466
Normalized cointegration equation :				
* Denotes for 5% significance level.				
** Denotes for 1% significance level.				

Table 2. Johansen and Juselius Cointegration Test for Men				
Cointegration Rank	**Trace Statistics**		**Max Statistics**	
	Critic Values	%5 Significance Level	Critic Values	%5 Significance Level
None *	45.82666	40.17493	26.62841	24.15921
At most 1	19.19825	24.27596	13.96247	17.79730
At most 2	5.235775	12.32090	5.067609	11.22480
At most 3	0.168166	4.129906	0.168166	4.129906
Normalized cointegration equation :				
* Denotes for 5% significance level.				
** Denotes for 1% significance level.				

Response to Cholesky One S.D. Innovations ± 2 S.E.

Response of Y to Y

Response of Y to PM

Response of Y to LM

Response of Y to HM

Response to Cholesky One S.D. Innovations ± 2 S.E.

Response of Y to Y

Response of Y to PF

Response of Y to LF

Response of Y to HF