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The Relationship between Human Capital and Economic Growth in Turkey

EyyüpEcevit[a], AyhanKuloğlu[b*]
[a]*Erciyes University, Faculty of Economics and Administrative Sciences, 38030 Kayseri, Turkey*
[b]*NevsehirHaciBektasVeli University, Vocational high School, 50300 Nevsehir, Turkey*

Abstract: *In this study,the casual relationship between the dynamics of human capital and economic growth were investigated in the Turkey economy over the period 1990-2013using ARDL approach.The main findings of this analysis are thatthere is a cointegration between the variables in the short and longterm. In addition that, health and education spending affects positively economic growth.These findings support the endogenous growth theory based on human capital.According to the findings,Turkey needs the investment of human capital to ensure economic growth.*

Keywords:*Human capital,economic growth,ARDL*

I. Introduction

Theoretical studies dealt with economic growthdates back to the economists like Smith, Ricardo and Marx.Together with developments in economic theory, literature studies examining the economic growthhave undergone an evolution.Abandon the descriptions based on traditional production factors and diminishing returns of classical economics in time, modern growth theory type of Solow-Swanwhich technology is externally incorporated into the model was developed. Solow-Swan growth model left place to the endogenous growth models taking into account the increasing returns to scale.New growth theories (R&D model (Romer, 1986), Human Capital Model (Lucas, 1988), Public Policy Model (Barro, 1991)) draw attention that a growth above steady state the growth rate may be performed. The neoclassical growth theory has contributed significantly the understanding of economic growth. Neoclassical growth models (Solow model) asserting long-term growth rate exogenously determined by a savings rate or technological developments ratedid not explain the source of growth.Income differences between developed and developing countries have explained Lucas (1988) and Romer (1986)'s study.

Endogenous growth theory tried to explain the sources of growth with assumptions the household working to improve the total benefits under budget constraints and companies working to maximize profits.This theory has a significant share in the technological development and labor for economic growth and stated that these variables endogenously determined (Romer, 1994).Endogenous growth theory stated that human capital and foreign trade is the driving force of economic growth (Lucas, 1988; Romer, 1989; Grossman and Helpman, 1991).Barro (1991) in empirical studies has obtained the finding that human capital are feeding growth rates.

The main objective of this study is to test the existence of a long-term relationship between economic growth and human capital using panel data analysis in the Turkey over the period 1990-2013. There are no studies with regard to the dynamics of human capitalin the literatureon the specified period. Existing paper is therefore expected to fulfill this gap and contribute to the empirical literature.

The following sections of this paper are organized as follows. In the second section, the literature search will be made related to the subject. In the third portion data and model will be described. In the fourth part, methodologies and findings will be presented. Finally in the last part general comments will be made.

II. Literature Review

There is a widespread view with regard to increasing economic development the human capital of the countries in the economics literature. Human capital is generally measured by health and education variables.Many empirical studies to test the relationship between human capital and economic growth are made. Many of studies in the literaturewere a positive relationship between the variables of human capital and growth (Webber, 2002;Mayer, 2001; Brempong and Wilson, 2003).As human capital indicators have been used education (enrollment rate, education spending per capita,..etc.) and health indicators (life time,health expenditure per capita,..etc.) in the studies of literature.

Studies conducted by many researchers have made estimates using the production function derived from the neo-classical economic theory (Goetz and Hu, 1996; Fernandez and Mauro, 2000; Barro, 1991; Mankiw at al., 1992; Bassanini and Scarpetta, 2001). In the mentioned study,human capital as a factor of production has been shown to have a direct positive impact on economic growth. McDonaldand Roberts (2002)

have reached the conclusion that human capital variable in the economic growth of countries is more effective in the advanced countries according to the developing countries.

Based on the neoclassical approach, human capital as a factor of production was insufficient to explain the economic growth.Therefore, economists have dealt with human capital within the scope of endogenous growth models. Empirical studiesusing endogenous growth models based on human capitalare considered human capital as a factor of production as well as a factor increases the productivity of other factors.The studiesmade by Hall and Jones (1999) using human capital based on the endogenous growth models stated that human capitalconstitutes a positive externality on other factors indirectly affect economic growth. In addition that, some empirical studiesstated that human capital contribute to economic growth affecting the variable total factor productivity and Research and Development (R&D) (Herbertsson, 2003; Barrio Castro at al., 2002; Fleisher at al., 2010).

Baldacci at al. (2008) explored the channels linking social spending, human capital, and growth using panel data from 118 developing countries in 1971–2000. They find that education and health expenditure has a significant and positive impact on economic growth. Zhang and Zhuang (2014) investegated the effect of the composition of human capital on economic growth using the Generalized Methods of Moments (GMM) method in China.Theyfindthattertiary education in developed regions play an important role while secondary and primary education play an important role on economic growth.Teixeira and Queirós (2016)find that human capital significantly and positively impacts economic growthfor highly developed (OECD) countries over the period 1960–2011. Human capital is the key to Research and Development (R&D) activities improved productivity, production of new products and technological progress (Bodman and Le, 2013; Teixeira and Fortuna, 2011).Some studies examining the relationship between economic growth and human capital on the Turkey economies is given below.

Mercan and Sezer (2014) investegated on the effect of education expenditure on economic growth for the period 1970-2012 in Turkey. They found that education expenditure have positive effect on economic growth on the Turkey economy. Mehrara and Musai (2013) investegated on the relationship between economic growth and human capital in developing countries including Turkey for the period 1970-2010. They found that economic growth is strongly influenced education. Şimşek and Kadılar (2010) reached the conclusion that human capital supports long-term growth over the period 1960-2004 in Turkey economy. Similar studiesindicating that human capital affects economic growth were conducted using different methods and time periods on the Turkey economy (Savaş, 2011; Genç, Değer & Berber, 2010; Özşahin & Karaçor; 2013).

III. Empirical Model and Data

Following previous studies on the relationship between human capital and economic growth, we model economic growth (EG) as a function of health expenditure (HE), goverment expenditure on education (EE) and gross fixed capital formation (GF).

$$EG_t = a_1 HE_t + b_2 EE_t + c_2 GF_3 + \varepsilon_t \qquad (1)$$

where $t = 1, \ldots, T$ denotes the time period.Our data covers over the period 1990-2013. Economic growthis represented by annual growth rate (%),health expenditure by the percent share of GDP (%), goverment expenditure on education by the percent share of GDP (%) and gross fixed capital formation by the percent share of GDP (%) in the equation 1 above. All variables are in natural logharitmcs. All data are sourced from the World Bank Databases.

IV. Empirical Methods and Results

Before estimating short and/or long run coefficients in a regression, one needs to determine whether the series in the model have unit root, or not. To this end commonly used time series unit root test (ADF test) will be applied. ADF tests the null hypothesis of a unit root against the alternative of stationary. ADF unit root test results are presented in table 1. As is shown in the table, results are mixed. While growth variable is stationary in levels; rest of the variables are stationary in first difference.

Table 1: ADF Unit Root

Variables	Level	1st Difference	Result
y	-5.187***	-7.903***	I(0)
lnk	-1.987	-4.824***	I(1)
lnh	-2.381	-2.781*	I(1)
lne	-0.107	-4.232***	I(1)

Note: Tests are carried out with an intercept.
Maximum lag is set to 4 considering SIC.
***, ** and * respectively indicate significance at 1%, 5% and 10%.

In case variables are not integrated of same degree, the most common estimation method is the usage of the ARDL model developed by Pesaran et al. (2001). The ARDL results are presented in table 2. According to the table, F-stat for cointegration proves that variables in model are moving together indicating the existence of cointegration. Once a long run relationship is established, the procedure estimates long run and short run coefficients based on the optimal lag lengths. Maximum lag length is set to 3 considering SBC.

Long run results show that a 1% increase in capital, health expenditures and education expenditures increases growth by 0.845%, 0.142%, and 0.121%, respectively. Short run results, on the other hand, indicate that a 1% increase in capital, health expenditures and education expenditures bond market development increases growth by 0.226%, 0.095% and 0.076%, respectively. Error correction term reveals that there is no problem with the process of error correction model mechanism. When it is about diagnostic checking, diagnostics and stability tests do not address to a statistical failure related to the ARDL modelling at 1% significance level.

Table 2: Cointegrationand Parameter Estimations

	Dependent Variable: y
Section-I: Cointegration and Errror Correction Model	
F-stat	14.026
Error Correction Term	-0.341[0.00]
Section-II: Long Run Results	
logk	0.845[0.00]
logh	0.142[0.00]
loge	0.121[0.00]
Section-III: Short Run Results	
logk	0.226[0.00]
logh	0.095[0.01]
loge	0.076[0.02]
Section-IV: Diagnostics	
Serial Correlation[a]	0.461[0.51]
Functional Form[b]	9.032[0.02]
Normality[c]	1.191[0.55]
Heteroscedasticity[d]	3.662[0.07]
Section-V: Stability Results	
CUSUM	S
CUSUMQ	S

Note: At 5% significance, lower and upper bound values for F-stat are 4.031 and 5.404, respectively.
[a]: Lanrange Multiplier test of residual serial correlation
[b]: Ramsey's RESET test using the square of the fitted values
[c]: Based on a test of skewness and kurtosis of residuals
[d]: Based on the regression of squared residuals on squared fitted values
S: stable. Numbers in brackets are probability values (p-values).

V. Conclusion

This paper empirically examines the role of education and health expenditures on economic growth in Turkey over the period 1990-2013 using ARDL approach. Cointegration results show that the variables are moving together in the long run. Long run estimations indicate that a 1% increase in capital, health expenditures and education expenditures increases growth by 0.845%, 0.142%, and 0.121%, respectively. Short run estimations, on the other hand, reveal that a 1% increase in capital, health expenditures and education expenditures increases growth by 0.226%, 0.095% and 0.076%, respectively. Overall, results prove the importance of human capital in increasing growth in Turkey. In addition that, the share of education and health in fixed capital investments is constantly increasing according to the data of Turkey(2000-2014).So, Fixed capital investments contribute directly and indirectly (together with channel of education and health investment) to economic growth more than education and health expenditures in Turkey economy.Implementing policies towards increasing human capital will boost economic growth strongly in the long term in addition its moderate impact even in the short term.

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