

**THE EFFECTS OF HEALTH EXPENDITURES ON ECONOMIC GROWTH: A PANEL
REGRESSION ANALYSIS ON BRICS COUNTRIES AND TURKEY**

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Abstract

In recent years, investment in human resources has been important factor for developing countries. So, with the importance of human capital, many studies have been done to indicate the presence of relationship between the health and economic growth. Because, health as human capital affects economic growth for countries. And also, health expenditures seen as a robust predictor of economic growth. In this paper, we aim to investigate the effect of health on economic growth by a panel data analysis. This article consists of data of BRICS countries and Turkey for the period from 2000-2014. Econometric results show that health expenditure has significantly positive effect on economic growth.

Keywords: Economic growth, health expenditure, public expenditure.

Jel Classification: O400, I150, I180

**SAĞLIK HARCAMALARININ EKONOMİK BÜYÜME ÜZERİNDEKİ ETKİSİ: BRICS
ÜLKELERİ VE TÜRKİYE ÜZERİNE BİR DEĞERLENDİRME**

Öz

Son dönemlerde gelişmekte olan ülkeler için beşeri sermaye önemli bir faktör olmaktadır. Bu yüzden, beşeri sermayenin öneminin artması neticesinde, birçok çalışma ekonomik büyüme ve sağlık arasındaki ilişkiyi vurgulamaktadır. Çünkü, beşeri sermaye yatırımı olarak sağlık harcamaları ekonomik büyümenin öncüsüdür. Bu çalışma, sağlık ve ekonomik büyüme arasındaki ilişkiyi panel veri analizi ile açıklamayı amaçlamaktadır. BRICS ülkeleri ve Türkiye'ye dair yapılan bu çalışma 2000-2014 dönemlerini kapsar. Ekonometrik çalışma neticesinde, sağlık harcamalarının ekonomik büyümeyi önemli ölçüde etkilediği sonucuna varılır.

Anahtar Kelimeler: Ekonomik büyüme, sağlık harcamaları, kamu harcamaları.

Jel Kodları: O400, I150, I180

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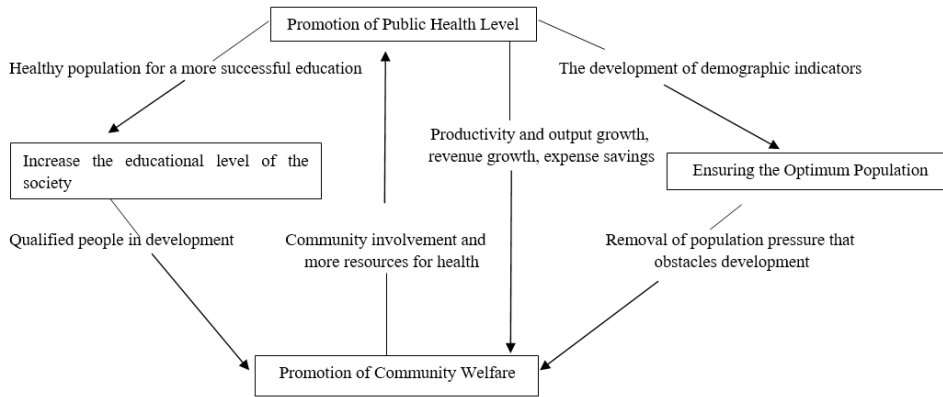
Introduction

“Human capital concept” which constitutes one of the main sources of economic growth is used to define concepts such as knowledge, skills, abilities, health status, place in social relations and educational level of individual or society (Taban and Kar, 2006). In other words, it defines “labor force” loaded with knowledge and skills in an economy (Simsek and Kadilar, 2010)

The structure of human capital is shaped mostly by education and health (Mushkin, 1962). In human capital theory that is developed by Gary Becker and his colleagues in the middle of 20th century, it is stated that education and health are building stones of human capital. This theory is considered as an important one in explaining growth differences between human capital and income differences, also it has an influence on economists sharing this for so long (Cetin and Ecevit, 2010).

Health, as human capital, effects economic growth both direct and indirect process. For example, its impact has on labor productivity and the economic burden of illness as a direct effect. It also has indirect effect since child health affects the future income of people through the impact that health has on education such as cognitive abilities, enrollment, and attendance (Lustig, 2006). Apart from this, it is seen that the individuals and societies that maintain life healthily are more active in production using natural sources, and through this, they contribute the social welfare (Tirasoglu and Yildirim, 2012).

Figure 1. *The Relationship Between Economic Development and Health*



Reference: Ismail Mazgit, “*Ekonomik Kalkınma Surecinde Türkiye’de Sağlık Sektörünün Yeniden Yapılanması*”, Unpublished phd thesis, Dokuz Eylül University, Izmir, 1998, p. 109.

The relation between health level and economic growth of society can be stated as shown in Figure 1. The health services which increase health level of society contribute to economic and social progress. The society with a higher education level has its place as qualified labor

work through the changes occur in health indicators. As a result of progress in health situation, population reaches an optimum level and population pressure which hinders development disappear. By this means, economic and social development gain momentum. Productivity and speed-up increase income growth, and income growth increases expenditure savings and economic and social development, accordingly level of welfare increases. The societies which ensure development aim to maximize health level and provide continuance of this level through allocating more sources for health. There is a mutual relation between health services, education and population. These three factors are the panzer of economic and social development (Akin, 2007).

1. Review of Literature

Researchers have attempted to examine the effect of health investment on economic growth in different countries and times. When looked at the literature, Grossman (1972) explores that health can be viewed as a durable capital stock that produces an output of healthy time. Health investments have important role for economic growth. Jones (1990) examines the relationship between government expenditure and economic growth for 1964-1984 years in USA by using the dummy variables. The author's findings show that health investment and transfer expenditure reduce economic growth. However, other expenditures by the local government encourage the economic growth.

Hansen and King (1996) studies the linkage between health expenditures and GDP of the members of OECD countries. By its unit root test, the series are non-stationary. It is emphasized that GDP is important to determine the level of health spending. Heshmati (2001) examines the conditional convergence of OECD countries over the period of 1970-1992 in gross domestic product and health care expenditure per capita. It is found that health care expenditures have a positive effect on economic growth and speed of convergence.

Dreger and Reimers (2005) explains health care expenditures and GDP for a sample of 21 OECD countries for 1975-2001 years. For this analysis it is used the panel cointegration method for finding out the long run relation as to whether. The results show that there is a long run relation between health and economic growth. Taban (2006) treats the casual relationship between economic growth and health indicators and data for Turkey during the period 1968-2003. The causality results indicate that there is not any relationship between number of medical institutions and real GDP growth, but bidirectional causality is found between real GDP growth and other health indicators.

Akin (2007) quests social security institutions including the majority of healthcare and pharmaceutical expenditure for the period 1998-2005 in Turkey. He finds that positive effects of economic indicators cause to positive health indicators. Akram (2009) makes its search by using time data of Pakistan for the period of 1972-2006. His study finds that per capita GDP is positively influenced by health indicators in the long run, and health indicators are having significant impact on per capita GDP. However, in the short run, the health indicators fail to put significant impact on per capita GDP.

According to Beraldo, Montolio and Turati (2009), the empirical analysis is based on a panel of 19 OECD countries between 1971 and 1998. Their result on public expenditure influences GDP growth more than private expenditure. As for Chakroun (2009) quests that national expenditures on health care and natural income for 17 OECD countries over the period of 1975-2003. The results indicate that health care is a necessity rather than a luxury. Additionally, relationship between income and health spending changes over time and across countries. Yumusak and Yıldırım (2009) examine the relationship between economic growth and nonphysical capital. The main findings of the analysis are that there is a linear causality between health expenditure and gross national product in Turkey. But this causality is small and negative. Also, there is one-way directional relationship from life expectancy at birth to gross national product.

Arisoy et al. (2010) search for the dynamic interactions among social expenditures as well as the components of these expenditures and economic growth for Turkey during the period 1960-2005. The results show that there is a positive effect of education, health, and social expenditures on economic growth. Aghion et al. (2010) emphasize that the relationship between health and growth is analyzed in the context of modern endogenous growth. For OECD countries between the period of 1960-2000, the outcomes of the analysis show that a higher initial level and higher rate of improvement in life expectancy having a significantly positive impact on per capita GDP growth.

Baltagi and Moscone (2010) explain the twenty OECD countries which were observed for 1971-2004 years by the use of panel data analysis. This analysis indicates that health care expenditure and most of its determinants are non-stationary, and they are linked in the long-run. Also, Cetin and Ecevit (2010) estimate the relationship between health expenditures and economic growth for the period 1990-2006 by using panel OLS method, and it consists of annual data of OECD countries. As a result, there is not any significant relationship between these variables.

Noronha et al. (2010) make estimations for Brazilian States between 1991 and 2000. They find a positive and significant correlation between the proportion of deaths from diabetes and cancer on the one hand and economic growth on the other hand. Sulku and Caner (2010) make expressions on the multivariate cointegration analysis between the long-term relationship among per capita gross domestic product, per capital health expenditures, and population growth rate for Turkey during the period 1984-1998. This study reveals that there is a long-term cointegration relationship among these variables. And also, it means a 10 % increase in per capita GDP is associated with an 8.7 % increase in total per capita health expenditures.

Aghion et al. (2011) quest the relationship between health and growth in light of modern endogenous growth theory for OECD countries over the period 1960-2000. Their analysis shows that both a higher initial level and a higher rate of improvement in life expectancy have a significantly positive impact on per capita GDP growth. Mehrara and Musai (2011) study that causal relationship between health expenditure and GDP based on the causality test in Iran over the period 1970-2008. The results show that a long-run relationship between

these variables over the period after the revolution.

Strittmatter and Sunde (2011) examine for 12 Western European Countries over the period 1820 until 2010. The results indicate that a reduction in infant mortality or crude death rates exhibit a positive effect on growth in income per capita and increased population growth. And also, it was explained that public health care system has a positive effect on the dynamics of infant mortality and crude death rates. Ak (2012) explains the existence of a long term causality relationship between the health expenditures, economic growth and life expectancy for Turkish economy. According to the empirical results, there is only a long-term relationship between health expenditures and economic growth.

Desmond et al. (2012) search the effect of government expenditure on economic growth in Nigeria for 1970-2009 period. In this period, the study shows that capital and recurrent expenditure on economic services and insignificant negative effect on economic growth. Elmi and Sadeghi (2012) study for developing countries during 1990-2009. The cointegration causality between economic growth and health care expenditures show a short-run causality from GDP to health care expenditure. However, in the long-term there is a bilateral causality between them.

Mehrara et al. (2012) quest the stationary and cointegration between the health and GDP expenditure for a sample of 13 MENA countries by the use of data for the period between 1995 and 2005. The cointegration analysis shows that strong evidence in favor of the existence of a long-run equilibrium cointegrating relationship between these variables. Tirasoglu and Yıldırım (2012) examine for the period 2006-2012 in Turkey. As to the results obtained from cointegration analysis, there is a long-run relationship between health expenditure and economic growth in the presence of one structural break.

Okoro (2013) studies the impact of government spending on the Nigerian economic growth for 32 years. These years start from 1980 to 2011. Additionally, the Granger Causality Test, Johansen Cointegration Test, and Error Correction Mechanism reveal that a long run equilibrium relationship between the variables exists. Santiago et al. (2013) calculate for income and health expenditure for the thirty-one OECD countries from 1970 to 2009, focusing on the differences between short and long term elasticities. It shows health expenditure is more sensitive to per capita income cyclical movements than trend movements are.

Akintude and Satope (2013) make investigations on the effect of health investment on economic growth in Nigeria over the period 1977-2010. According to the vector error correction model, there are long-run and positive relationship between the variables. Babatunde (2014) examines the impact of health expenditure on economic growth in Nigeria for 1970-2010 years. He finds that public health expenditure has a vital relationship with growth and development of any nation.

Rajeshkumar and Nalraj (2014) study for four states in India over the period 1991-2010. The results revealed on there exists a unidirectional causality from health expenditure to economic growth in all four states. Selim et al. (2014) focus on that the relationship between

per capita health expenditures and economic growth were requested for 27 EU Member Countries and also Turkey in the period including the years 2001-2011. This data is tested, using the method of panel data analysis. The findings show there is a positive relationship between these variables in the long and short term.

Akar (2014) expresses the relationship between health expenditures, relative price of health and economic growth are inquired depending on the data covers the period from 2004 to 2013 for Turkey. The results of the study indicate there is a significant relationship between health expenditures, relative price of central government budget health expenditures, and economic growth in the long term. However, there is no relationship in the short term. Fernández et al. (2014) analyze the role of health capital on economic growth for Spain, during the period 1980-2007. The empirical results of them show that the overall effect of mortality on growth come out negative and statistically significant.

Lachebeb et al. (2014) study for the MENA countries (Middle East and North Africa), by using panel data estimation on 1995-2010 years. This study reveals that health expenditure and education have significantly positive effect on economic growth. Bozkurt (2015) investigates short and long-run relationship between information-communication, education and health sectors with economic growth, taking them together. The analysis results imply that there is long-run relationship between GDP, information-communication, education, and health sectors.

Kurt (2015) studies the direct and indirect effects of health expenditures on economic growth, using the data of 2006-2013 years for Turkey. It is concluded that the direct impact of government health expenditures on economic growth is positive and significant despite its indirect impact is shown as negative. Finally, Sahbudak and Sahin (2015) examine the relationship between health indicators and economic growth in the BRIC countries with the method of panel data analysis. The results reveal there is positive relationship between the health spending share of GDP, life expectancy at birth, and economic growth. But, there is negative relationship between economic growth and infant mortality rates for these countries.

2. Econometric Methodology, Data and Results

The estimation of economic relations is carried out by the help of panel data models which are constituted with cross sectional data with a time dimension; in other words, panel data is called “panel data analysis”. In this analysis, it is generally seen that the number of term (T) is more than the number of cross sectional unit number (N) (Yerdelen Tatoglu, 2012).

A simple regression model in a panel data analysis is simply defined as: $Y_{it} = \alpha_i + \beta X_{it} + u_{it}$. In this equity, t (t=1, 2, ..., T) shows each time interval, i (i=1, 2, ..., N) shows cross-sections. α_i shows cross section which are considered constant throughout time and i shows individual cross section (Eratas et al., 2013). Stability is controlled in cross sectional data analysis, and in order to do it, the unit root analysis is conducted.

Panel root tests are conducted in two ways according to consider cross sectional units as dependent and independent. Panel root testing methods which are also called “first generation testing” is developed through hypothesis that cross sectional units are independent from each other. Im, Pesaran and Shin (2000), Maddala and Wu (1997), Levin, Lin and Chu (2002), and Hadri (2000) and Choi (2001) are examples of this (Guloglu and Ispir, 2011). The next step is to determine the long term relation between variables. In this point, cointegration analysis is used to do that (Dickey et al., 1991).

In cointegration analysis of panel data series, the model, developed by Pedroni (1999, 2004) and shown in equation 1, is the mostly used one. Where T refers to the number of observations over time and N refers to the number of individual members in the panel. Also, M refers to the number of regression variables. In equation, in order to determine whether there is a long term cointegration relationship between y and x, the stability of eit residues controlled.

$$y_{it} = \alpha_i + \delta_{it} + \beta_{1i} X_{1it} + \beta_{2i} X_{2it} + \dots + \beta_{Mi} X_{Mit} + e_{it}$$

for $t=1, \dots, T$; $i=1, \dots, N$; $m=1, \dots, M$ (1)

Pedroni purposes the seven tests for cointegration. The first three tests of the four tests in the first category are nonparametric tests. The first test is a statistic in the type of variance. The second one is similar to Philips-Peron (PP) (rho), and the third one resembles to PP (t) statistics. The fourth one is a parametric statistic which resembles Augmented Dickey Fuller (ADF) (t) statistics. In the second category, the first of three tests resembles to PP (rho) statistics, and the other two tests resemble to PP (t) and ADF (t) statistics (Guvenek and Alptekin, 2010).

The Panel data of Brazil, Russia, India, China, South Africa (BRICS) and Turkey, which belong to the years between 2006 and 2014, is used in the study. The data about Gross Domestic Product and Health Expenditure are got from the data base of World Bank (WB). The logarithm of these variables are obtained in this manner.

Table 1. The Panel Unit Root Test Results

Variables	Levin-Lin&Chu t*	Im, Pesaran and Shin W-Stat	Hadri Z-Stat	Hadri Z-Stat (Heterosce- dastic)
PCGDP	-0.59	0.70	4.10*	3.94*
PCHE	-0.76	-0.74	3.67*	3.96*
Δ PCGDP	-6.82*	-1.82**	3.44 *	4.17*
Δ PCHE	-11.46*	-3.02*	3.36*	3.69*

*, (**) show level of significance at 1 % and (5 %), respectively. Δ symbol shows the first rank differences.

It is seen that the panel variables are not stationary at level. The unit root tests with individual effects are applied again to see the first differences. It is observed that the first

rank differences of variables are stationary. In order to test the long-term relation between the same rank stable series, the Panel Cointegration Test can be applied.

Table 2. *The Results of Pedroni Cointegration Tests*

Panel V-stat	-0.49
Panel rho-stat	-0.13
Panel PP-stat	-2.25**
Panel ADF-stat	-4.83*
Group rho-stat	0.52
Group PP-stat	-4.49*
Group ADF-stat	-3.41*

, () indicate rejection of the null hypothesis of no cointegration at the 1% , (5%) level, respectively.*

Table 2 shows Pedroni cointegration test results. The null hypothesis is “no cointegration” between these variables. As a result of this test, there exists a cointegration relationship (except rho-stat) between health expenditure and economic growth in long run.

3. Conclusion

In this study, we examined the relationship between health investment and economic growth for BRICS countries and Turkey during the period 2000-2014 by the use of panel data analysis. Firstly, the series were tested by Levin, Lin and Chu, Im, Pesaran and Shin, Hadri unit root tests. By these tests, the series are stationary at I(1) level. Thus, the Panel Cointegration Test were tested. The results of this test, health expenditure has positive effect on economic growth. So, we can say that productive investment in the field of health increase the level of human capital. Especially in developing countries to give importance to health which is important component of human capital would contribute significantly to economic growth.

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