THE RELATIONSHIP OF HEALTH EXPENDITURES AND ECONOMIC GROWTH: AN ANALYSIS ON TURKISH ECONOMY (1988-2019)[1] [2]

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ABSTRACT | Health and education expenditures are named the sources of human capital accumulation. It is claimed that health and education expenditures make a positive contribution to the economic growth process through human capital accumulation. The development of health expenditures in Turkey in the period 1988-2019 and its impact on economic growth is emphasized in this study. In this context, the effects of the health expenditures (HE) and the life expectancy at birth (LEB) on economic growth (GDP) were analyzed with the ARDL co-integration test. As a result, there was a co-integration relationship among the variables in the long run. In the study, a positive relationship was determined between HE, LEB and GDP in 1998-2019 period in Turkey. In this framework indicated that one-unit increase of HE leads to an increase of 0.112 units in GDP and one-unit increase in the LEB caused a rise of 0.018 units in GDP. When the effects of HE and LEB variables on economic growth are compared, it is concluded that the HE effect is greater in Turkey. Also, within the framework of Toda-Yamamoto causality analysis, it was found that there was bidirectional causality relationship between HE and economic growth.

Keywords: *Economic growth, health expenditures, Turkey, ARDL, co-integration.*
JEL Codes*: I15, O47, 015*
Scope: *Economics*
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[1] This article study has been prepared with the inspiration from the master thesis of Yasin Söğüt, under the supervision of Prof. Dr. Adem Üzümcü. In this article, the statistical data has been updated to a great extent and new variables and different econometric analysis are included in the empirical analysis..

[2] Ethical rules are followed in the study.

SAĞLIK HARCAMALARI – İKTİSADİ BÜYÜME İLİŞKİSİ: TÜRKİYE EKONOMİSİ ÜZERİNE BİR ANALİZ (1988-2019)

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ÖZ | Sağlık ve eğitim harcamaları, beşeri sermaye birikiminin kaynakları arasındadır. Sağlık ve eğitim harcamalarının beşeri sermaye birikimi yoluyla iktisadi büyüme sürecine pozitif katkı yaptığı ileri sürülmektedir. Bu çalışmada sağlık harcamalarının Türkiye'de 1988-2019 dönemi gelişimi ve iktisadi büyüme üzerindeki etkisi üzerinde durulmuştur. Çalışmada sağlık harcamalarının GSYİH'daki payı (SH) ve doğuşta yaşam beklentisinin (DYB) iktisadi büyümeye etkisi ARDL eşbütünleşme testi ile analiz edilmiş ve bu değişkenler arasında uzun dönemde eş-bütünleşme ilişkisi bulunduğu sonucuna ulaşılmıştır. Çalışmada, Türkiye'de 1988-2019 döneminde SH ve DYB ile GSYİH arasında pozitif yönlü ilişki belirlenmiştir. Bu çerçevede SH'de görülen bir birimlik artışın GSYİH'da 0.112 birim artışa ve DYB'de görülen bir birimlik artışın GSYİH'da 0.018 birim artışa yol açtığı görülmüştür. Türkiye örneğinde SH ve DYB değişkenlerinin iktisadi büyümeye etkileri karşılaştırıldığında SH etkisinin daha büyük olduğu sonucuna ulaşılmıştır. Ayrıca, yapılan Toda-Yamamoto nedensellik analizi çerçevesinde sağlık harcamaları ile iktisadi büyüme arasında çift yönlü nedensellik ilişkisinin bulunduğu sonucu elde edilmiştir.

Anahtar Kelimeler: *İktisadi büyüme, sağlık harcamaları, Türkiye, ARDL, eşbütünleşme.*

JEL Kodları: *I15, O47, 015*

Alan: *İktisat*
Türü: *Araştırma*

1-INTRODUCTION

Economic growth basically refers to the changes in real Gross Domestic Product (GDP) level in a country, usually seen within a year. Economic growth is a very critical issue for both developed countries and developing countries. However, while the developed countries attach importance to economic growth, developing countries attach significance to the economic development process, which includes structural, institutional and technological changes, including important developments in production, consumption, foreign trade and sectoral structure, which will be strengthened by stable economic growth (Üzümcü, 2018: p. 5-6.) Economic growth can also reveal healthy society interaction by enabling the increase in social programs that developed / changed health services in the country, individual and social health services and treatment services, and the resources allocated for health services such as public health and vaccination (Biggs et al., 2010: p.266).

Education and health expenditures are two important components that positively affect human capital accumulation. Human capital accumulation can be defined as a process in which people's knowledge, skills and abilities are endogenized. (Demir, Üzümcü ve Duran, 2006) From a theoretical perspective, it is accepted that there is a positive relationship between economic growth and human capital. Health is the locomotive of economic growth and plays an important role in reducing economic problems such as unemployment, poverty and inequality. Health expenditures made for the development of health services contribute to economic growth by developing human capital, and at the same time growth can be ensured as the progress of economic growth is transferred to investment in human capital accumulation (Akıncı ve Tuncer, 2016: 47).

While health is a source of welfare for people, it is also a significant determinant in the economic growth. Health services and health expenditures, which play an important role in human capital accumulation, contribute to economic growth by rising the productivity of individuals. All expenditures made for the protection, improvement, and continuity of the health of humans, as well as for the treatment of the diseases that have occurred, are included in the health expenditures. Not only health expenditures raise people's health standards, but also like education expenditures, health expenditures accelerate development process through human capital accumulation.

The relationship between health and economic growth occurs in various ways. In this context; positively health conditions increase the productivity of the labors and enable the production to be carried out in a shorter time. Economic growth defined as the real increase in production and/or per capital income is one of the issues that developed and developing countries. Although there are

traditional sources of economic growth such as physical capital, labor force, natural resources and technological progresss, the productivity of the labor force and human capital accumulation are also important. Labor productivity may remain low when the labor is unhealthy. It is seen that health indicators are relatively better in developed countries that can increase health expenditures and effectively provide health services. In this context, the possibility of stable economic growth is higher in developed countries with the positively effect of human capital accumulation.

The two sub-components of human capital accumulation are education and health expenditures. The thoughts that especially education expenditures affect economic growth positively can be traced back to A. Smith. It can be said that educated and healthy employees are in the background of economic efficiency depending on the division of labor and specialization concepts of A. Smith. However, the relationship between human capital and economic growth, especially in relation to education expenditures, did not come to the fore until the studies of Schultz and Becker in the 1960's. (Üzümcü, 2018).

In Harrod-Domar and neoclassical growth models, the amount of labor force, physical capital accumulation and investments are given importance, while other important sources of economic growth such as technological development and human capital are neglected. Contrary to these traditional growth models, in which the labor is homogeneous and technological development is considered an external factor, the quality and skill of the labor, human capital accumulation in the country and the level of technological development are of great importance in the process of economic growth.

In this context, unlike traditional growth models in endogenous growth models, the process of economic growth is linked to endogenously growth sources such as knowledge, human capital, technological development, R&D expenditures, scale economies, and externalities (Demir ve Üzümcü, 2003). For example, in Romer's (1986) endogenous growth model, specific knowledge at the firm level, technological changes, and the total stock of knowledge capital at the country level provide the endogenous economic growth mechanism.

Romer (1986), Lucas (1988), Barro (1990), Rebelo (1991), Grossman and Helpman (1991), and Aghion and Howitt (1992) are among the economists who put forward endogenous growth models that emphasize knowledge capital, human capital, public infrastructure expenditures externalities, research and development expenditures, the diffusion and spillover effects of knowledge, technological progress, innovation processes by through creative destruction. Endogenous growth sources such as knowledge capital, human capital, technological change, creative destruction and learning by doing, which are

prominent in the endogenous growth models of economists such as Romer (1986), Lucas (1988), Grossman and Helpman (1991) and Aghion and Howitt (1992), are not new concepts. These concepts were previously expressed by economists such as Smith, Marshal, Young, Arrow, but their deserved place in the theoretical and empirical analyzes of economic growth as endogenous growth sources was made possible by the endogenous growth models. (Üzümcü, 2018).

Looking at the sources of endogenous growth within this framework human capital accumulation is one of the critical sources in economic growth, which is also noted in endogenous growth models like Lucas (1988) seminal paper. In addition to education, enables the labor to acquire skills, health; which enables an efficient and effective labor, plays an important role in achieving human capital accumulation. Because, being socially healthy means that people in the society are physically healthy and economically active labors. In this framework, an important literature has emerged that empirically analyzes the close relationship between health expenditures and economic growth. In the studies, the relationship between public sector health expenditures, individual health expenditures or total health expenditures and economic growth could be empirically examined by various econometric methods. In this context, the relationship between economic growth and total health expenditures 1988-2019 periods in Turkey is analyzed empirically.

In the context of the plan of the article, after this introduction, the second title economic growth and the development of health expenditures in Turkey in the 1988-2019 period are analyzed, in the third title focuses on the general theoretical framework of the relationship between health expenditures and economic growth variables. In the fourth title, domestic and foreign literature, empirically analyses the relationship between the economic growth and health expenditure, are briefly introduced. In the fifth title, there is empirical analysis including cointegration and causality analysis. In the sixth and last title, the results of the empirical study are briefly evaluated.

2. HEALTH EXPENDITURE AND GROWTH IN TURKEY

Nominal-real health expenditures and nominal-real GDP in Turkey is given in Table 1for 1988-2019 period. As seen in the table, during the period 1988-2019 nominal total health expenditure in Turkey has increased in general. Total health expenditures in nominal terms reached from 2.7 million TL (Turkish Lira) in 1988 to 8,2 billion TL in 2000 and were realized at the level of 201 billion TL in 2019.

Table 1. Health Expenditures and GDP in Turkey (1988-2019, Million TL)

Year	Nominal Health Expenditures [3] (Million TL	Nominal GDP (Million TL)	GDP Deflator (2009= 100)	Real Health Expenditures (Million TL)	Real GDP (Million TL)
1988	2,7	178	0,038	7.135	466.650
1989	5,8	313	0,066	8.641	467.825
1990	11,4	541	0,106	10.759	511.123
1991	17,6	867	0,168	10.437	515.859
1992	36,8	1.505	0,275	13.367	546.729
1993	70,7	2.728	0,461	15.312	590.697
1994	119,0	5.325	0,953	12.474	558.471
1995	245,6	10.686	1,785	13.759	598.632
1996	519,2	20.335	3,174	16.354	640.568
1997	1.113	39.695	5,763	19.320	688.795
1998	2.518	71.945	10,124	24.868	710.757
1999	4.985	107.374	15,621	31.912	687.564
2000	8.248	171.494	23,328	35.356	735.235
2001	12.396	247.266	35,674	34.747	692.959
2002	18.774	362.110	49,079	38.252	737.639
2003	24.279	472.172	60,525	40.114	780.150
2004	30.021	582.853	68,058	44.111	856.573
2005	35.359	680.276	72,894	48.507	933.599
2006	44.069	795.757	79,725	55.276	998.465
2007	50.904	887.714	84,682	60.112	1.048.823
2008	57.740	1.002.756	94,875	60.859	1.057.371
2009	57.911	1.006.372	100,000	57.911	1.006.372
2010	61.678	1.167.664	107,012	57.636	1.091.181
2011	68.607	1.404.928	115,775	59.259	1.213.394
2012	74.189	1.581.479	124,364	59.655	1.271.497
2013	84.390	1.823.427	132,160	63.854	1.379.394
2014	94.750	2.054.898	141,968	66.740	1.447.532
2015	104.568	2.350.941	153,080	68.309	1.535.607

[3] Turkish Statistical Institute (TURKSTAT) data base in Turkey's total health expenditure data starts from 1999. TURKSTAT announced that in 1999 the share of public health expenditure in total health expenditures data for 62%, the share of private sector health expenditure is around 38%. The health expenditures data for the period 1988-1998 in the table are given by V. Yılmaz and N. Yenturk "Historical Perspective on Health Expenditures in Turkey" in the study benefiting from Table 6. In addition, "Budget Expenditures and Incomes Realizations 1924-2019" of the Ministry of Treasury and Finance were checked with the actual expenditures of the Ministry of Health and transferred to the table. We calculated the total nominal health expenditures for the period 1988-1998 by adding the nominal health expenditures in the private sector (by 35%) to the nominal public health expenditures realized in these studies.

2016	119.756	2.626.560	165,477	72.370	1.586.637
2017	140.647	3.133.704	183,363	76.704	1.705.666
2018	165.234	3.758.316	213,796	77.285	1.756.136
2019	201.031	4.320.191	246,005	81.718	1.772.232

Source: Turkish Statistical Institute (2021), Health Expenditure Statistics, President of Republic of Turkey, Strategy and Budget Department (2021), Economic and Social Indicators, Turkey Statistics Institute Harmonized According to the data, GDP (2009 base year), Table 1.9**.**

The improvement of real health expenditures in the 1988-2019 periods in Turkey is situated in chart 1. As seen in the chart, health expenditures increased from approximately 7.1 billion TL in 1988 to approximately 38.3 billion TL in 2002. During the Justice and Development Party (AK Party) period, real health expenditures increased rapidly and reached approximately 59.7 billion TL in 2011, within the framework of the importance given to health expenditures, as shown in Chart 2. Although total health expenditures declined in real terms in 1994, 1999, 2001 and 2009 due to economic crises, total real health expenditures increased after 2013 and reached 81.7 billion TL in 2019.

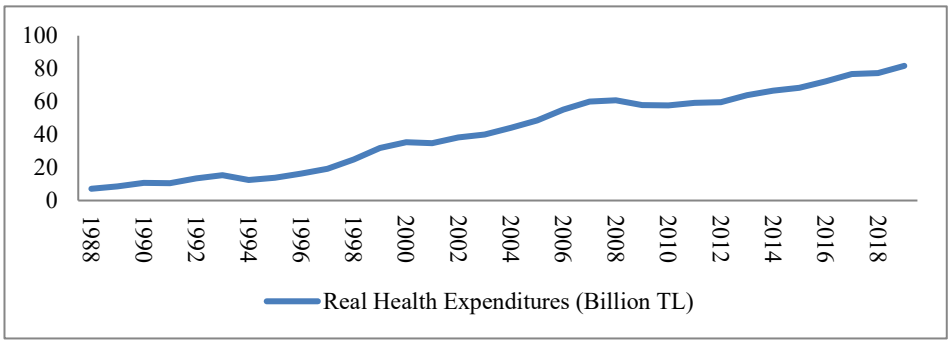

Chart 1. Real Health Expenditures in Turkey (1988-2019, BillionTL)
Source: TURKSTAT (2021)

Real change rates in total health expenditures were generally positive in this period, especially in 1989, 1990, 1998 and 1999; an increase of 20% -30% was experienced. On the other hand, real decrease occurred in some crisis years (18.5% in 1994, about 2% in 2001 and 4.8% in 2009). It can be said that the growth rates of real health expenditures followed a less volatile after 2001. If we look at nominal and real GDP development in this period in Turkey, as shown in Table 1 above, while nominal GDP level was 178 million TL in 1988, it exceeded 170 billion TL in 2000 by effect of high inflation in 1990's. Nominal GDP level

reached 2.1 trillion TL in 2010 and 4.3 trillion TL in 2019.

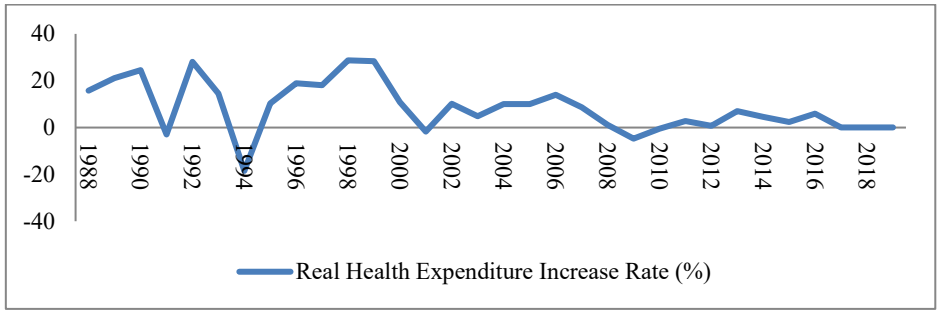

Chart 2. Real Health Expenditures Growth Rates in Turkey (1988-2019, %)
Source: TURKSTAT (2021)

As can be seen in Chart 3, the real GDP level reached to 732 billion TL in 2000, while it was approximately 466.7 billion TL in 1988, according to the GDP series based on 2009. During the AK Party period, which achieved political and economic stability the real GDP level continued to increase, and the real GDP, which exceeded the level of 1 trillion TL in 2007, approached the level of 1.8 trillion TL in 2019.

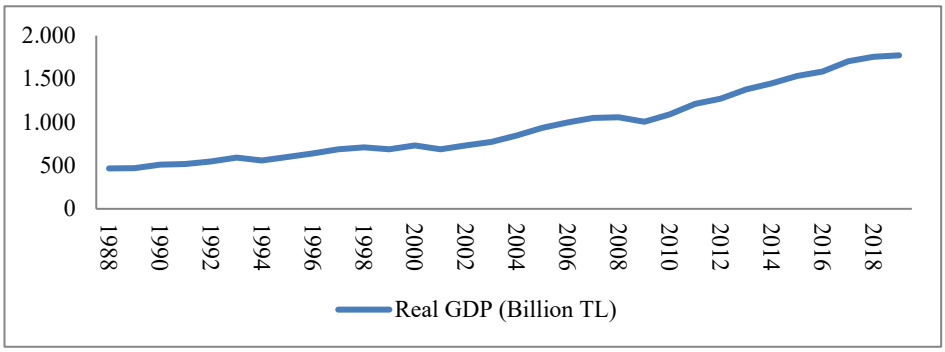

Chart: 3. Real GDP in Turkey (1988-2019, Billion TL)
Source: Republic of Turkey, Head of Strategy and Budget (2021).

Real GDP growth rate in Turkey during the 1990-2001 economic crises (1994, 2001) and three times the negative effects of the Marmara Earthquake in 1999, as seen in Chart 4, in the 2003-2019 period, it turned negative (-4.8%) in 2009 only with the effect of the global financial crisis. However, the real growth

rate decreased regularly until 2009, when the effects of the global financial crisis after 2004 were felt, it is noteworthy that the recession in 2009, when it decreased to a very low level of 0.8% in 2008 and the impact of the global crisis on our country was observed.

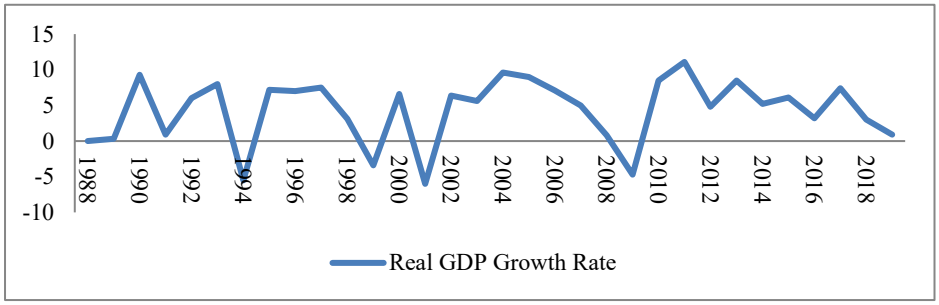

Chart 4. Real GDP Growth Rates in Turkey (1988-2019, %)
Source: Republic of Turkey, Head of Strategy and Budget (2021).

After tax cuts and increased government expenditures provided against the global crisis increased domestic demand strongly and real growth rates were realized above the potential growth rates in Turkey, %8.4 in 2010 and %11.1 in 2011. However, in this high growth rates framework, while the Turkish lira overvalued, the rapid rise in energy prices caused imports to increase more than exports, and foreign trade and Current Accounts Balances (CAB) deficits are increased rapidly. In this context, the ratio of CAB deficits to GDP increased to a high rate of 9% in 2011.

In order to prevent this negative trend, economy management circles tried to cool down the economy and to apply the brakes during the growth process since the last quarter of 2011 (Üzümcü & Başar, 2011). Focusing carefully on the relationship between credit expansion and the CAB deficits, the Central Bank of Republic of Turkey (CBRT) slowed down the credit expansion. As a result, the real growth rate decreased relatively in 2012 and realized at the level of 4.8%. After the growth rate of 8.5% in 2013, when CBRT and economy management returned to domestic demand expansion policies.

Growth rates decreased relatively in 2014, when there were local elections and Presidential elections, and in 2015, when there were two general elections and in 2016, when the July 15 FETO coup attempt took place, the real growth rate decreased to 3.3% (Chart 4). In 2017, when economically expanding policies were followed to eliminate the negative economic effects of the coup

attempt, the real growth rate increased again and reached 7.5%. Turkey's economy in the high external deficit, rising inflation and unemployment rates relative is concerned, 2018 due to the crisis experienced (by US priests Brunson) US President Trump's via twitter the decision to increase the taxes on iron and steel products exported to the USA, caused the dollar / TL exchange rate to increase rapidly, in this environment of rapid contraction in economic activities, the real growth rate decreased to 3% in 2018 within the context of the "balancing process" specified in the "New Economy Program" announced in October 2018. In the new balancing process, the real GDP growth rate decreased to a very low level of 0.9% with the effect of the economic shrinkage in the first two quarters of 2019, when the contraction in domestic demand continued. Therefore, it can be said that the economic growth rates have followed a quite volatile course in the last five years. Conversely Turkey achieved a growth rate of 1.8% although the negative effect of the global Covid-19 pandemic embracing the world in 2020.

At this point, we can also refer to the development of life expectancy at birth in Turkey in the empirical analysis part in order to see the increasing life expectancy effect with the positive effect of increasing health services, in addition to the positive impact of economic growth on the health expenditures. As is known, though economic growth rates "skid" in 1990-2001 period (as a result of rent economy conditions which can be summarized as high inflation, high interest rates and rapidly depreciating TL) in Turkey, especially in the political and economic stability environment provided by the AK Party after 2002, within the framework of the increasing per capita income and health expenditures, we can say that a steady raise in the life expectancy at birth occurred in the term of 1988-2019, as seen in Chart 5.

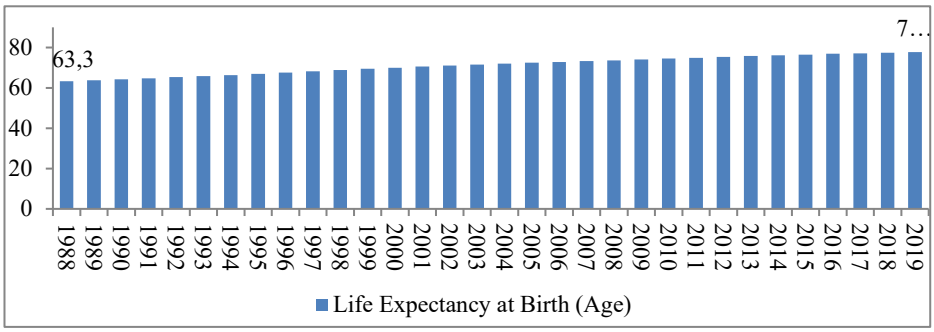

Chart 5. Life Expectancy at Birth in Turkey (1988-2019, Age)
Source: Worldbank (2021)

In this framework, as clearly seen in Chart 5, while life expectancy at birth which was 63.3 years old in 1988, increased to 71.1 years old in 2002 and 77.8 years old in 2019 within the framework of increasing per capita income and health services.

3- THEORETICAL FRAMEWORK

The World Health Organization defines health services as "a permanent system organized throughout the country in order to realize the objectives that change according to the needs and wishes of the society by making use of different types of health personnel in certain health institutions, and thus to provide the health care of individuals and the society with all kinds of preventive and therapeutic activities". In short, we can define health services as all the efforts carried out by different types of health personnel to diagnose and treat diseases and to protect the current health of people through various health institutions and organizations (Karabulut, 1998: p. 16).

Expenditures on health and education are two important elements that play a role in human capital accumulation. Education, as much as the fundamental building block of human capital, the level of health is another building block that has enabled the development and protection of human capital. In this regard, it could be said that there was a close relationship between the economic development status of a society and its health level. Concordantly, the fact that a country has a healthy society and an efficient labor makes the country's economy strong and stabilizes its economic growth. All expenditures made for the provision of these services are collected under the name of health expenditures. According to the National Health Accounts (NHA), it is not only the expenditures made to regain health in case of health deterioration, but also expenditures for health protection such as vaccination nutrition and health investments are also considered "health expenditures" (Söğüt, 2019).

Health expenditures are among the long-term determinants of economic growth as a factor that provides human capital accumulation. Therefore, when an individual increases her skills and knowledge, the level of productivity in economic activities also increases. In this context, receiving the formal, non-formal, in-service training, one must be in good health to engage in economic activity. From this point of view, health expenditures are evaluated within the human capital stock (Karagül, 2002: p. 70; Üzümcü, 2018).

Health services, which enhance the health level of the society, make a positive contribution to economic and social development. A society with an increased level of education takes part in the growth and development process as a skilled labor, along with improvements in health indicators. With these

improvements in the field of health services, the population reaches the most effective level and the problem of population pressure that hinders development is eliminated. (Mazgit, 1998: p. 109). In this framework, the interaction between the increase in health expenditures and the increase in the quality of health services can be seen chart 6.

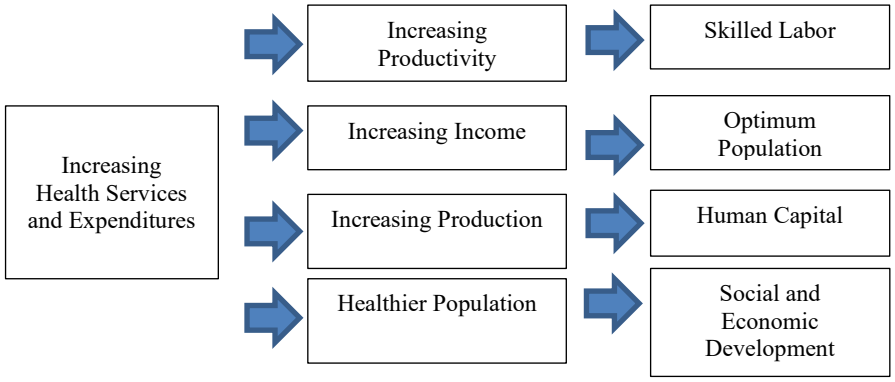

Chart 6: The Relationship of Health Expenditure and Socioeconomic Development

Source: Mazgit, 1998, p. 109.

Despite the main source of human capital accumulation, in Lucas' (1988) endogenous growth model, is the time allocated to education and the skills obtained in the education process, health level is also seen as another factor contributing to human capital accumulation. In this sense, there is the positive relationship between the health level of the society and economic development in the context of the participation of a healthy individual as an effective labor force in the production process (Taban, 2006).

The capital stock falls on health separately from human capital. The reason of the capital stock falling into health separately is that Grossman aimed to show the difference between these two types of capital. This difference arises from the fact that the human capital stock increases the productivity of the individual in the market, while the capital stock that falls on health determines the amount of time the individual has to acquire goods and money (Grossman, 1999). It is known that health expenditures (Mushkin, 1962), which are seen as an investment, have positive effects on economic growth, and expenditures on health and education are described in development economics literature as

"current development expenditures". In this framework, it can be argued that healthy and educated individuals behave both more efficiently and more effectively as producers / consumers in the society. In this context, the fact that healthy people can be better and easily educated, and the healthy and educated active labor is a factor that increases the production level through human capital accumulation is mentioned in endogenous growth models. Within this context, it is stated that if healthy / educated individuals survive longer, they will have the opportunity to benefit from the investments for them for a long time and also the spillover effect, which provides the opportunity to transfer their skills / human capital accumulation to the next generations as parents (Üzümcü, 2018).

It can be said that the increase in the level of health services in a country leads to an increase in total output due to the more efficient and productive use of the labor, thus positively affecting the growth and development of the country and in positive interaction with other factors. Health expenditures between social and economic dimensions that may interact positively can be counted as its interaction with demographic factors (for example, by affecting the population growth rate, contributing to reaching the optimum population and reducing overpopulation pressure), contributing to the increase of savings and investment rates in the country, positive interaction with other factors affecting human capital accumulation, labour force participation rate and increasing labor productivity (Karagül, 2002: p. 72).

The existence of a two-way positive relationship between supply and demand dimensions, health expenditures and economic growth is an accepted condition in economic theory. In this context, it is seen that health services, which open the way for citizens to access all health services provided by private or public and are subsidized by the state, have a positive contribution to economic growth in terms of supply and demand, and in a developed society, the increasing welfare level and the increase in the health needs of the aging population lead to a re-increase in health expenditures. Hence, it can be said that the relationship between public health expenditures and economic growth is positive and bilateral in the context of causality (Üzümcü & Söğüt, 2020). Developed countries have invested in the labor both in the past and today, and especially in the human capital that has led to the increase of the skills and abilities of the labor and the transfer of them to the following generations. Developed countries increase their health expenditures as much as possible every year in order to realize their human capital accumulation, strive to increase the number of access to health services and allocate more resources from their budgets in order to enhance the quality of health services. Concordantly, it can be said that treating patients, trying to protect human health and improving it further is the key to the stable economic growth

process and among the indispensable for developing countries to ensure their economic development (Mazgit, 1998).

In addition health expenditures have a great significance for the development of countries across the world. In addition, life expectancy at birth covers a long period in developed countries. In Turkey, which is one of the developing countries, it is precious to reveal the relationship between health expenditures and economic growth. Therefore, the current study aims to analyze the effect of health expenditures in Turkey on economic growth. When the literature is examined, Gross Domestic Product (GDP) and health expenditures data are generally used for the relationship between economic growth and health expenditures. The positive relationship between health expenditures and economic growth is a generally accepted judgment (Karagül, 2002: 72). Higher incomes provide more access to health-promoting goods and services, such as better nutrition, safe water, and health care.

On the other hand, health will increase the productivity of the population. Because the employees will be in better condition physically. Healthy people devote more time to training to improve their abilities and derive longer-term benefits from it. The increase in average life expectancy will raise physical investments. The increase in life expectancy at birth will enhance the working age population (Mushkin, 1962: p. 136-137).

In this context, this study, which determines to analyze the relationship between health expenditures and economic growth in Turkey from 1988 to 2019, it is a contribution both in terms of the diversity and difference in the data sets included in the analysis, and by extending the periods of the analyzes carried out to obtain more realistic results by covering the following years. In this article, the relationship between economic growth rates, which are thought to cause an increase in individual and total health expenditures in Turkey, is focused on. In this context, it is convenient to compendiously assess the development of health expenditures and real GDP growth rates (real economic growth rates) in Turkey in 1988-2019 period.

4- LITERATURE REVIEW

There is an extensive literature that researches the relationship between health expenditures and economic growth. The literature on this subject might be extensive because health expenditures and education expenditures are considered as sub-components of human capital and the relationship between economic growth and human capital is willing for being investigated from the 1960's to the present. In these empirical studies, the relationship between human capital and economic growth or its subcomponents, education and health expenditures and

economic growth, is analyzed holistically with different econometric methods (time series, cross section, panel analysis etc.) in the context of individual income or its influence on the country's GDP.

In addition, in empirical analyzes that test the positive relationship between economic growth and health in terms of human capital, sometimes refer to indicators in the field of health, for example, life expectancy at birth, which we have included in our empirical analysis, as well as the number of patients per healthcare professional, number of patients per doctor, etc. is also included. Sometimes, when examining the relationship between health expenditures and economic growth, the relationship between economic growth rate and variables such as total health expenditures, per capita health expenditures, the share of public health expenditures in the budget or the share of total health expenditures in GDP. They are also analyzed. Therefore, empirical analysis based on models in which many different variables can be included leads to the enrichment of this literature.

At this point, Table 2 contains summary information of some studies in the context of domestic and foreign literature investigating the relationship between health expenditures and growth. The countries were covered by the empirical studies and the results obtained are listed in the table.

Table 2. Some Empirical Studies on Health Expenditures and Growth

Writers	**Period - Methodology**	**Result**
Bloom et al. (1998)	1960-1989 Cross Section Analys. 75 African Countries	Life expectancy at birth has a positive influence on GDP, while infant birth and mortality rates have a negative effect.
Bhargava et al. (2000)	1965-1990 Panel Data Analysis 92 Countries	Positive relationship between health expenditures and economic growth.
Erdil and Yetkiner (2004)	1990-2000 VAR model 75 High Income Countries	Causality relationship from health expenditures to growth in high-income countries and from economic growth to health expenditures in low-and middle-income countries.
Beraldo, Montolio, and Turati (2009)	1971–1998 Panel Data Analysis OECD Member Countries	Health expenditures have a positive effect on growth. A 1% increase in health expenditures raises per capita GDP by approximately 0.06% to 0.10%. A large part of this increase due to public expenditures.

Yardımcıoğlu (2012)	1975-2008 Cointegration test 25 OECD countries	Positive and significant relationship between health and economic growth variables in the long run, and that there is bidirectional causality between variables.
Alhowaish (2014)	1981-2013 Granger Causality Saudi Arabia	It has been observed that there is a one-way causality relationship from economic growth to health expenditures.
Öztürk and Topçu (2014)	1995-2012 Panel Data Analysis G8 Countries	Health expenditure affects economic growth in the short term. Economic growth rate affects health expenditures in the long run.
Halıcı-Tülüce, Doğan and Dumrul (2016)	1995-2012 -1997-2009 Panel Data Analysis 25 High Income Countries	Two-way causality between growth and health expenditure in the short run, and one-way causality from growth to health expenditure in the long run.
Akıncı and Tuncer (2016)	2006Q1-2016Q2 Granger Causality Turkey	There is a long-term cointegration and bidirectional causality relationship between health expenditures and economic growth.
Atılgan, Kılıç and Ertuğrul (2017)	1975-2013 ARDL Analysis Turkey	Increase in health expenditures positively affects the economic growth by 0.434%. Positive relationship between health expenditure and economic growth model also supports the results of the filter method.
Demirgil, Şantaş and Şantaş (2018)	2010-2016 ARDL Limit Test Turkey	A co-integration relationship between the series. It was determined that health expenditures had a positive effect on economic growth during the period analyzed.
Şen and Bingöl (2018)	2006-2017 Causality Analysis Turkey	Bidirectional causality has been identified between health expenditures and growth.
Çelik (2020)	2000-2016 Panel Data Analysis G20 Countries	One-way causality relationship from economic growth to health expenditures.
Ibukun and Osinubi (2020)	2000-2018 Panel Analysis 47 African Countries	Economic growth strengthens health and increasing per capita expenditure causes air pollution.
Bayraktutan and Alancıoğlu (2020)	2000-2017 Panel Bootstrap Granger Causality Analysis 17 OECD	Causality relationship from economic growth to health expenditure for Germany, Sweden and Denmark. Unidirectional causality relationship from health

	Countries	expenditure to economic growth for Portugal, Greece, Belgium, Italy, the Netherlands, Iceland, and Luxembourg. Turkey, Switzerland. Bidirectional causal relationship for Ireland and Austria.

As can be seen, different results are seen in empirical studies conducted for different periods, different country examples and different methods on the relationship between health expenditures, total health expenditures and economic growth. In addition, it is concluded that there is a long-term relationship between variables, whether there is a positive/negative relationship and that there is one-way or two-way causality relationship.

5- EMPIRICAL ANALYSIS

In testing the relationship between economic growth and total health expenditures, the method was explained before the empirical analysis, and then the data, model and econometric analysis were included.

5.1. Method and Data

As of the 1988-2019 period in Turkey, this study the impact of Health Expenditure (HE) on Economic Growth (GDP) was analyzed through the autoregressive distributed lag (ARDL) cointegration test. In the analysis, considering that economic growth increases health expenditures as well as increase in health expenditures can also increase life expectancy, the Life Expectancy at Birth (LEB) variable is also added to the model.

Cointegration tests are used in the analysis of long-term relationships of variables. In general used cointegration tests, variables must be stationary to the same degree. This situation creates some problems in using the cointegration test. These problems are eliminated by the ARDL method, which allows the analysis of the long-term relationship between variables that are not stable at the same degree. The ARDL method in the empirical analysis is developed by Peseran et al. (2001) and it is widely used in cointegration tests as an analysis format (Altun & İşleyen, 2019).

The real GDP growth used in the empirical analysis, namely economic growth rate data for Turkey Statistical Institute (TURKSTAT) and Economic and Social Indicators of Strategy and Budget Department of the Republic of Turkey. Health expenditures data were obtained from TURKSTAT data as indicated in the footnote and life expectancy data at birth from World Bank's official website. The data were analyzed with Eviews 10 program. Since the time series utulized in the empirical analysis are publicly available data of official institutions such

as TURKSTAT, Ministry of Treasury and Finance, World Bank.

5.2. Ethical Permissions of Research

In this study, all rules stated to be followed within the scope of "Higher Education Institutions Scientific Research and Publication Ethics Directive" were followed. None of the actions stated under the title "Actions Against Scientific Research and Publication Ethics", which is the second part of the directive, have not been carried out. In this study, there was no situation that required ethical permission.

The data used in the empirical analysis part of this study were obtained from official sources (TURKSTAT, etc.). There was no situation requiring ethical permission, and the data used in the analysis are clearly shown in the tables and graphs above.

5.3. Stationarity Analysis

Stochastic processes in time series studies is increasing. In general, a stochastic process is called "stationary" if the covariance value between two time periods and the mean variance do not change systematically over time, which depends only on the distance or delay between the two time periods and not on the actual time of the calculated covariance value. (Demir & Görür, 2020). The presence of unit root in variables means that the series are not stationary. Analyzes made with non-stationary data may not give healthy results and may cause spurious regression. (Altun, İşleyen & Görür, 2018: p. 231). As a result of empirical studies, it was determined that most of the time series consist of non-stationary series. It is one of the many different methods recommended to regression the differences by taking the differences of these series instead of non-stationary series in order to provide stationarity in series. In this framework, augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were used to analyze the stationarities of variables. Analysis results of ADF are given in Table 3 and analysis results of PP are showed in Table 4. The hypotheses used for the unit root test are as follows;

$$H_0: \rho = 0, The\ series\ is\ not\ stationary$$
$$H_1: \rho < 0, The\ series\ is\ stationary$$

The ADF unit root test results for both constant and constant + trend models by taking differences between first order I (1) and at level I (0) of variables are shown in Table 3. Table 3 showed that the H_0 hypothesis is accepted for the series of health expenditures (HE) ($p > 0.05$) and life expectancy at birth

in both constant and constant + trend model. Therefore, it can be said that the series related to these two variables are not stationary at the 5% significance level, that is, they contain unit roots. On the other hand, it is seen that the real GDP series regarding economic growth is stable (p <0.05). For the real GDP series, the level H_0 hypothesis is rejected and the hypothesis that the series does not contain unit roots is accepted. In order to stabilize the non-stationary HE and LEB series, their first order differences are taken. When these variables first-order differences were analyzed, according to the constant and the constant + trend model, the H_0 hypothesis for the LEB and HE variables was rejected (p <0.05). Thus, according to the ADF unit root tests, it was observed that when the first order differences of these variables were taken, they became stable at the 5% significance level.

Table 3.ADF Unit Root Test Results

Variable	I(0)				I(1)			
	Constant		Constant +Trend		Constant		Constant +Trend	
	t-stat	p-value	t-stat	p-value	t-stat	p-value	t-stat	p-value
GDP	-2.134	0.004	-3.201	0.005				
HE	-2.478	0.413	-3.378	0.401	-2.301	0.001	-3.004	0.020
LEB	-2.370	0.230	-3.416	0.396	-2.251	0.001	-3.203	0.001

p<0.05

The PP unit root test results for the constant and constant + trend models with the level I (0) and first order differences I (1) of the variables are also given in Table 4. According to both constant and constant + trended models, the hypothesis is accepted in the PP stationarity analysis in the level HE and LEB variables series (p> 0.05) thus, it can be said that the variables of HE and LEB are not stationary at the 5% significance level, that is, they contain unit roots. Again, it is seen that the real GDP series included in the economic growth is stable (p <0.05). For the real GDP series, hypothesis is rejected and the hypothesis that the series does not contain unit roots is accepted.

Table 4. PP Unit Root Test Results

Variable	I(0)				I(1)			
	Constant		Constant +Trend		Constant		Constant +Trend	
	t-stat	p-value	t-stat	p-value	t-stat	p-value	t-stat	p-value
GDP	-2.214	0.001	-3.127	0.002				
HE	-2.271	0.398	-3.701	0.390	-2.304	0.001	-3.301	0.002
LEB	-2.235	0.410	-3.631	0.381	-2.617	0.001	-3.410	0.001

$p<0.05$

The results of the analysis indicated that when the first order differences of the non-stationary HE and LEB series were taken according to the PP test, the hypothesis was rejected for both the constant and the constant + trend model for the HE and LEB variables ($p<0.05$). Thus, after taking the first order differences of these variables, it can be said that they become stationary according to the PP unit root test at the 5% significance level.

5.4. ARDL Cointegration Analysis

In the literature, cointegration tests such as Engle and Granger (1987) and Johansen (1988) are frequently used to examine the long-term relationship between variables. The most important constraint in these tests is that all variables to be included in the model must be stationary at the I(0) level. According to the stationarity test results, if there are stationary variables at different levels such as I(0) and I(1) in the models, the ARDL model, which makes it possible to examine the cointegration between the variables stationary at different levels, is used instead of the traditional cointegration tests.

With the ARDL model proposed by Peseran et al. (2001) long-term relationships at different stationarities can be examined, and statistically better results can be obtained using the unconstrained error correction model (ECM) compared to traditional cointegration tests. With the unconstrained ECM, short-term relationships can be examined as well as long-term relationships between variables (Akel & Gazel, 2014; Belen & Karamelikli, 2016).

In this study, the hypothesis that there is a cointegration relationship between economic growth, health expenditures and life expectancy at birth is tested within the framework of ARDL cointegration test. The use of ARDL cointegration analysis was preferred as a more appropriate method in the cointegration analysis, since the GDP, HE and LEB variables discussed in the study are seen as a more appropriate method in the literature, because the time series show stability at different levels.

H_0: *There is no cointegration between the variables*
H_1: *There is cointegration between the variables*

Within this framework, ARDL cointegration boundary test has been used, and the results regarding whether there is cointegration between variables at 1%, 5% and 10% significance level are in Table 5 showing the calculated F statistic value is greater than the upper limit critical value at the 5% significance level. Accordingly, H_1 hypothesis is accepted and it is determined that there is cointegration between variables according to the ARDL boundary test.

Table 5.ARDL Cointegration Limit Test

The number of arguments (k)	F statistic Value	Significance Level	Criticial Values	
			Lover Limit	Upper Limit
2	19.4256	%1	1.83	2.903
		%5	2.13	3.59
		%10	2.61	3.63

After determining a long-term relationship between variables with the F test, the parameters of this relationship were estimated with the ARDL model based on the Least Squares (LS) method and the results are in Table 6.

Table 6.ARDL (1, 2, 2) Model

Variables	Coefficients	Standard error	t- statistics	p. value (p)
Const. (c)	0.017893	0.001478	6.571362	0.031
GDP(-1)	0.103647	0.078312	-2.741693	0.013
HE (-1)	0.127853	0.063219	-2.378901	0.019
HE (-2)	0.107524	0.001436	-2.368710	0.021
LEB (-1)	0.136402	0.032147	-2.317895	0.025
LEB (-2)	0.112365	0.036415	-2.017852	0.031

$p<0.05$

Table 6 contains the values of the variables in the ARDL (1, 2, 2) model. Table 6 indicates that each variable has a significant and positive coefficient ($p <0.05$).

One of the important elements that should not be ignored in the analysis

made with the ARDL model is the basic assumptions of the LS.

Diagnostic test results for the basic assumptions of the LS are given in Table 7. The R^2 coefficient expressed as a percentage varies between 0 and 1 and shows how much of the variance in the dependent variable is explained by the independent variables. In this context, it is seen that approximately 75% of the change in real GDP, representing economic growth, can be explained by HE and LEB. It is understood that with adjusted R^2, approximately 71% of the variation in GDP can be explained by HE and LEB. Since the Breush-Godfrey LM test value is greater than the probability value ($p > 0.05$), it can be said that there is no problem of variance in the model. Whether there is autocorrelation in the estimated model is determined by ARCH test. Since the ARCH test value seen in the table is greater than the probability critical value, it is accepted that there is no autocorrelation. In the context of Jargue-Bera normality test, it is observed that the errors have a normal distribution according to Table 7 ($p > 0.05$). When the Ramsey-Reset test probability value is greater than the critical value, it is concluded that there is no modeling error.

Table 7.ARDL Diagnostic Tests

Diagnostic Tests	**test statistics**	**p. value (p)**
R^2	0.750136	
Adjusted R^2	0.716520	
F-Statistics	12.143026	0.001
Breush-Godfrey LM Test	0.540367	0.348
ARCH Test	2.390172	0.281
Jargue-Bera Normality Test	0.493075	0.432
Ramsey-Reset Test	1.801637	0.601

Table 8 shows the values of the parameters calculated with the long-term ARDL model. In this way, the state of the long-term relationship between variables can be determined. In the study, the GDP dependent variable, HE and LEB show the independent variables. According to Table 8, a positive and significant relationship between HE and LEB and GDP ($p < 0.05$) has been determined. In this framework, a one-unit increase in HE will result in an increase of 0.112 units of GDP and one unit increase in LEB leads to an increase of 0.018 units in GDP. From these results, compared to the effects on the economic growth of HE and LEB variables in Turkey it can be said to be greater than the effect of the HE increases.

Table 8. Long Term ARDL Cointegration Results

Variables	Coefficients	Standard Error	t- statistics	p
Constant (c)	0.108349	0.003621	5.104562	0.023
HE	0.112470	0.014785	-2.163147	0.002
LEB	0.018632	0.027369	-2.214690	0.002

After these analyzes, the stability of the ARDL model was investigated by determining whether there is any structural break in the variables. CUSUM and CUSUMQ charts are used for this. In CUSUM and CUSUMSQ charts, if the variables are within the critical limits, it might be said that the ARDL model is stable and model coefficients are stable.

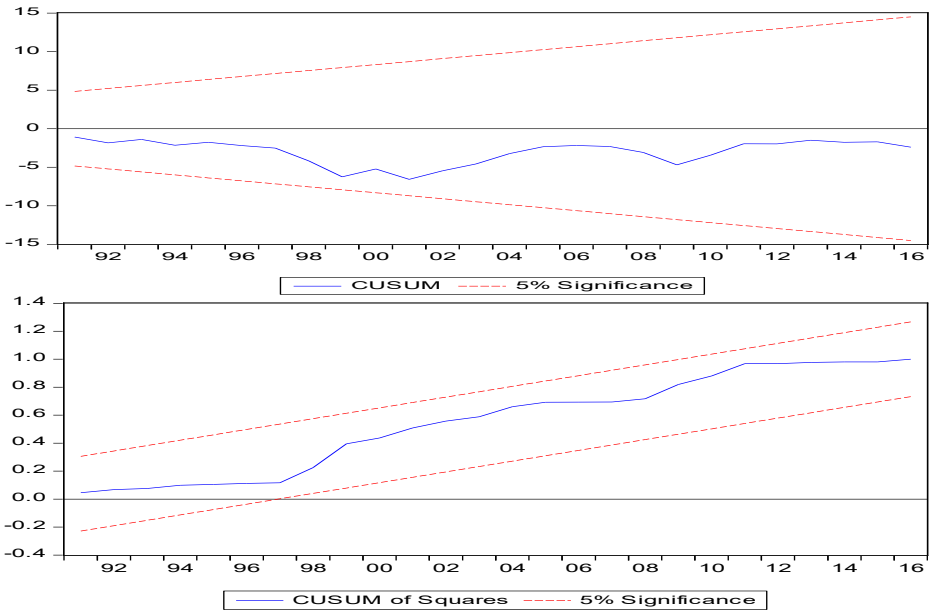

Chart 7. CUSUM and CUSUMQ results

Chart 7 shows the stability of the estimated ARDL model. When the CUSUM and CUSUMSQ graphs were examined, it was determined that the variables were between the critical limits at the 5% significance level. In this case, it was observed that there was no structural break in the variables according to the selected model and the long-term coefficients calculated by the ARDL

boundary test were stable.

5.5. Toda-Yamamoto Causality Test

After performing the ARDL cointegration analysis, Toda-Yamamoto (1995) causality test was used to determine the direction of causality among variables. First, the appropriate lag length was determined in the VAR Model, and then Toda-Yamamoto Causality Test was performed.

As seen in Table 9; considering sequentially modified LR test statistic, Schwarz information criterion (SIC), Hannan-Quinn information criterion (HQ), Final prediction error (FPE) and Akaike information criterion (AIC), the appropriate lag length was obtained as 1. Since all values provide the same optimum delay, it can be said that the series do not have variance serial correlation problem and they have normal distribution.

Table 9. Selection of the lag length of the VAR model

Lag	LR	SC	HQ	FPE	AIC
1	41.01547*	23.28041*	21.03715*	2915.2713*	19.06270*
2	49.34782	27.07614	25.00143	3124.016	21.10419
3	51.04861	29.10083	25.70391	3361.179	21.50793
4	53.07126	30.00731	26.00617	3641.061	22.16820

The Toda-Yamamoto Causality Test results applied after determining the optimum lag length are also included in Table 10.

Table 10. The Results of Toda-Yamamoto Causality Test

Causality	test statistics	probability value (p)
GDP → HE	2.731	0.034
HE → GDP	2.976	0.001
GDP → LEB	2.731	0.021
LEB → GDP	2.045	0.091

When Table 10 is examined, GDP, that is, economic growth is the reason for the increase in HE ($p \leq 0.05$). Likewise, it is seen that the increase in HE is the cause of the increase in GDP, that is, economic growth ($p \leq 0.05$). In this case, it can be said that the analysis period as a bi-directional causality relationship between economic growth and the increase in health expenditure is available for the case of Turkey.

Nonetheless, the GDP growth causes LEB in the 5% significance level for Turkey ($p \leq 0.05$). However, LEB is not a cause of GDP growth ($p \geq 0.05$).

Therefore, it is noteworthy that the probability value is below 10%. As a result of this, in the analysis period examined in the example of Turkey, it is found that one way directional causality relationship is from economic growth to LEB.

6. CONCLUSION

Health expenditures are one of the noticeable sources of human capital accumulation together with education expenditures. In this sense, health expenditures are a factor that feeds human capital accumulation and contributes significantly to its development. It might be mentioned that there was a mutual relationship between economic development and health status in a country. In general, it is remake that health services and health expenditures are higher in total and individual level in today's developed countries compared to developing countries and the standards and quality of health services are higher. In this context, it can be said that as the resources allocated to health in economically developed countries have increased, the health awareness of individuals living in these countries is relatively higher than those living in other countries.

At this point, when we look the development of real health expenditures in Turkey, a developing country, which consists of sum of the public and private health expenditures, in 1988-2019 term, it is seen that the real health expenditures have increased significantly at the total level. In this context, it is noteworthy that real health expenditures reached 81.7 billion TL in 2019 from 7.1 billion TL in 1988. Turkey's real GDP level has reached 1.8 trillion TL in the same period from about 466.7 billion TL. According to TURKSTAT's statistics of 2019 in Turkey, per capita health expenditure was 2434 TL (335 USD) in 2019, more than three quarters of total health expenditures were covered by the general government budget, and households paid 16.7% of their total health expenditures from their own pockets (TURKSTAT, 2021. Conversely, the share of total real health expenditures in real GDP increased during this period, while it was 1.5% in 1988, it increased to 5.8% in 2008, but then decreased relatively to 4.7% in 2019. However, it is positive that the ratio of health expenditures to GDP has tripled compared to beginning of the period. In addition, recent practices such as city hospitals to improve healthcare infrastructure, has provided an opportunity to offer better health care services than most of the developed countries in the process of COVID-19.

In the literature, the relationship between health expenditures and economic growth was examined by using panel and causality analyzes on total health expenditures and public health expenditure variables. In the current study, along with the variables of health expenditures and growth, life expectancy at birth was also included, and ARDL cointegration analysis was used in addition

to causality analysis.

In current study, in Turkey the relationship between health expenditure and economic growth is subjected to econometric analysis utilizing annual data for the 1988-2019 period. Within the framework of the results of the econometric analysis, a bilateral causality relationship between economic growth and health expenditures has been determined. In addition, ARDL cointegration analysis confirms that there is a long-term cointegration relationship between health expenditures and economic growth variables.

In consequence of this study, it was seen that stable economic growth in line with the theoretical framework, positively contributed to the rise in health expenditures. Moreover, within the framework of Toda-Yamamoto causality analysis, as demonstrated by the two-way causal relationship between two variables, as the economic growth process makes it possible to make more health expenditures, while life expectancy at birth increases with the increase in health expenditures, it can also positively affect economic growth through a healthy labor and human capital accumulation channel.

7. CONFLICT OF INTEREST STATEMENT

There is no conflict of interest between the authors.

8. FINANCIAL SUPPORT

No funding or support was used in this study.

9. AUTHOR CONTRIBUTIONS

AÜ, YS: Idea and Design

AÜ, YS: Theoretical Framework

YS: Literature Review

AÜ: GDP and Health Expenditure analysis in Turkey

YS: Data Collection

AÜ, YS: Data Analysis and Interpretation

AÜ, YS: Interpretation of Findings

AÜ, YS: Writing of Article

AÜ: Critical Review of Article

10. ETHICS COMMITTEE STATEMENT AND INTELLECTUAL PROPERTY COPYRIGHTS

Ethics committee principles were followed in the study. There has been no situation requiring permission within the framework of intellectual property and copyrights.

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