

The Relationship Between Economic Growth and Public Health Service Expenditures in Upper Middle-Income Countries

Üst Orta Gelirli Ülkelerde Ekonomik Büyüme ve Kamu Sağlık Hizmeti Harcamaları Arasındaki İlişki

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ABSTRACT

In this academic study, the specific correlation between economic growth and healthcare expenditures will be evaluated through the panel data analysis method, using the public healthcare expenditures data of 25 upper middle-income countries between the years 2000–2009. In the study, national general government expenditures per capita were used as a key indicator typically representing healthcare expenditures. The explanatory variables in the model are the gross fixed capital formation and the ratio of employment to population. As a result of the extended Hausman test, it was decided that the model was suitable for the two-way fixed effects model. In the fixed effects model, the Driscoll–Kraay estimator was used because of the deviation from the basic assumptions. According to the apparent results of the economic model, there is remarkably a certain relationship between public healthcare expenditures and economic growth. In other words, the results of the economic analysis support the view that investments in the health sector in upper middle-income countries lead to an increase in economic growth, primarily in its contribution to public health. In this direction, it is expected that the study will contribute to forthcoming studies in terms of emphasizing the importance of public investments in terms of actors and institutions in the health system.

JEL Codes: C33, E01, C33, I18

Keywords: Driscoll–Kraay, economic Growth, fixed effect models, public healthcare expenditure

ÖZ

Bu çalışmada 25 üst orta gelirli ülkenin 2000–2009 seneleri arasındaki kamu sağlık hizmeti masrafları verilerinden faydalanılarak sağlık ve iktisadi büyüme arasındaki bağlantı panel veri analiz metodu aracılığıyla değerlendirilecektir. Çalışmada kişi başına ulusal genel devlet harcamaları, sağlık harcamalarını temsil eden gösterge olarak kullanılmıştır. Modeldeki açıklayıcı değişkenler ise gayri safi sabit sermaye oluşumu ve istihdamın nüfusa oranıdır. Genişletilmiş Hausman testi sonucunda modelin iki yönlü sabit etkiler modeline uygun olduğuna karar verilmiştir. Sabit etkiler modelinde temel varsayımlardan sapma nedeniyle Driscoll–Kraay tahmincisi kullanılmıştır. Modelden elde edilen neticeye göre, kamu sağlık hizmeti harcamaları ile iktisadi büyüme arasında olumlu yönde bir bağlantı bulunmaktadır. Diğer bir ifadeyle analiz sonuçları, üst-orta gelirli ülkelerde sağlık sektörüne yönelik yatırımların başta kamu sağlığına yaptığı katkı ile bağlantılı olarak ekonomik büyüme artışına yol açtığı görüşünü destekler niteliktedir. Bu doğrultuda çalışmanın sağlık sistemi içinde yer alan aktörler ve kurumlar açısından kamu yatırımlarının önemini vurgulaması anlamında gelecekte yapılacak olan çalışmalara katkı sağlaması beklenmektedir.

JEL Kodları: C33, E01, C33, I18

Anahtar Kelimeler: Kamu Sağlık Harcamaları, Ekonomik büyüme, Driscoll–Kraay, Sabit Etki Modelleri

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Introduction

Economic growth is defined as the increase in production factors, national product, and total factor productivity. In other words, it means the enrichment of society with an increase in real production and real income. The prime factors affecting economic growth are listed as natural resources, human capital, capital investment, technological development, and sociopolitical climate. Among these factors, particular importance is attributed to human capital. Education, health, and population growth are, moreover, determinants of human capital. To remain specific, human capital, including in endogenous growth theory, is shown as the most critical factor determining economic growth with physical capital (Durur et al., 2019, pp. 19-21).

The endogenous growth models, which have come to the fore in the economic growth literature, especially since the 1980s, focus on the key reasons behind the noticeable increase in economic production. These studies investigate the determinant factors of economic growth. But they also focus on the notable differences in economic growth and income levels between developed and developing countries. Health represents a critical factor in explaining growth and income disparities. For people to be productive and obtain an economic contribution, the condition of being healthy is one of the essential needs. Health, which remains a critical element of human capital, has direct and indirect effects on production levels and growth rates. The productivity and savings of healthy individuals constitute significant contributions to economic progress (Durur et al., 2019, p. 17).

The quantitative and qualitative development of the labor factor is of considerable importance for the growth targets of national economies. Desired outputs in the national economy are directly related to educated and healthy individuals, namely human capital. The increase in individual productivity contributes to the productivity of all factors of production in the economy as a whole (Sayin, 2015, p. 289). Being healthy not only extends the time that people spend working life but also affects their income levels. Therefore, health can be considered an important determinant of savings and investment rates due to its impact on labor productivity. For this reason, investments in health support economic growth by increasing income (Güvenek, 2015, p. 217). Furthermore, the fact that the healthcare sector is the source of technological development has made this field a core area of interest for growth theories. Notably, the pharmaceutical and biomedical industries contain production processes that require intensive research and development activities (Karaçor et al., 2015, pp. 239-240). For these reasons, health services retain a significant place in government policies. The determining factors of state policies in the field of health include decisions regarding healthcare expenditures. In other words, preferences at the macro level fall into the intervention area of politicians. The macro-level decisions taken by the state are the most primary determinants of the decisions and measures to be taken at the microlevel. In this direction, it is significant to determine the priorities in health policies and determine the cost-effectiveness situation. Due to increased expenditures, alternative costs of resources used in the health sector are also increasing. Therefore, the efficiency of resources allocated to the field of health has become a critical issue (Çelik, 2019, p. 315-318). The main reasons for the health sector to become a sector that uses more and more resources can be listed as follows (Çelik, 2019, p. 319):

- Increasing demand for health services in parallel with the rise in health awareness.
- Prolongation of the average life expectancy.
- The development of technology in the medical field and its increasing expense.
- Decreasing infectious diseases, increasing long-term chronic instead.

As the health sector becomes a sector that utilizes more and more resources, understanding whether and how healthcare expenditures provide economic growth is becoming more and more critical for public policy. Based on this increasing importance, the share of resources allocated to different policy options is determined depending on the relative effectiveness of each. In today's modern economies, where human capital precedes other production factors and the productivity and creativity of the labor factor gain a strategic quality, an increase in studies dealing with the relationship between growth and health draws attention. Economic growth is a primary criterion in measuring health and economic values obtained from health. Consumption trends, people's income level, capital accumulation, education level, and environmental factors, which remain factors that affect health status other than access to health services, are equally directly related to economic growth. When it comes to the evaluation of the health system, the effective use of resources, the performance level of the health system in general, and the form of financing are also reflected in public health as an output of economic policy choices. The health expenditures of the state, which represent the leading actor in the functioning of the health system, as a health services production unit and the social security system it has designed to have a significant impact on building a healthy population. However, in the health services market, which has a rapid development trend, it can be stated that the financing of health services tends to increase continuously with the increase in the input prices of technological equipment, drugs, and treatment processes. It is also a leading part of this financing process that doctors, who remain the most decisive factor in the system, undergo a long and costly training process. Neoliberal policies, which constitute the intellectual and philosophical infrastructure of today's political and economic orientation, support a market-based system in terms of the efficient distribution of resources. This market-based understanding is also adopted for health services. The formation of a transnational production network in the field of health, a gradual decrease in public health expenditures, and the widespread use of the private health insurance system reflect the indicators of global capitalism devices in the health system. Contemporary globalization and neoliberal policy critiques focus on financial fragility and income inequality as well as the decline in public resource allocation to human capital. A similar neoliberal policy debate, exacerbated by the 2008 financial crisis, has been experienced in the health sector after the COVID-19 pandemic. The inadequacy and fragility of the health system against a global epidemic have been associated with the market-oriented nature of the current system. The number and quality of doctors in countries, technological equipment of hospitals, health service fee levels, coordination of logistics services, intensive-care unit adequacy, insurance system, number and quality of trained intermediate staff, the existence of crisis strategy, and adequacy in health legislation are of enormous importance. Public health expenditures have a minor role in the formation of all these factors. The public health importance of available public resources in an unexpected global pandemic,

including in advanced economies, has a significant impact on the questioning of policy choices. While Anglo-Saxon geography typically prefers a liberal system in policy preferences regarding the health system; predominantly German and Scandinavian countries adopt the concept of the social state. Differentiation in the health system also leads to differentiation in the delivery of health services. The weights of the components of university hospitals, training, and research hospitals that take part in tertiary health care services, and the components of public and private hospitals that provide secondary health care services in the system can also change within the framework of policy preferences.

Public expenditures in the health system are important not only for the treatment process but also for preventive and preventive medicine practices. Another factor affecting the life expectancy at birth variable, widely used in economic growth analysis, is preventive and preventive medicine practices. In preventive and preventive medicine practices, it is aimed to prevent the disease before it occurs. It is known that preventable diseases like high blood pressure, smoking, high cholesterol, and obesity remain the primary causes of preventable deaths worldwide. At this point, it can be said that eliminating inequalities in health will increase the quality of life, and therefore a socioeconomic gain will be experienced. It can be stated that factors reflecting health inequalities like malnutrition and inactivity, air and water pollution, and hygiene problems have a significant impact on health status differences between developed and developing countries. Widespread poverty is also directly related to health inequality. For this reason, preferences in the provision of health services in underdeveloped and developing countries come to the fore. The gain to be achieved with the increase in the prevalence and effectiveness in the field of preventive and preventive medicine is not only limited to the increase in the quality of life but also the high-cost burden of high-priced medical treatments avoided. The prevalence of diabetes and blood pressure in today's modern life and the losses it causes can be shown as the most significant example of this situation.

The change of public and private shares in health expenditures, privatization preferences, and the leading role of the state shape health service delivery in close relation to health financing. The differentiation in the delivery of health services to enormous masses in countries where public healthy financing is common has the potential to make a more marked difference for countries with fragile economies than for developed countries. The fact that economic growth is significantly correlated with the productivity of human capital also points to the need for more thought on health financing and its structure. Therefore, in recent years, we have witnessed an increasing number of studies on health economics. We see the literature on economic growth, and health expenditures have gained diverse results in themselves. The first part of the study gives the literature dealing with the relationship between economic growth and healthcare services.

Economic Growth and Healthcare Expenditures

Studies dealing with the relationship between economic growth and healthcare expenditures mostly show a positive relationship. There are many academic studies in which investments in healthcare expenditures cause favorable consequences on economic growth. However, it is noted that different results are also obtained in relation to income level. Indeed, various regions of a similar country can differentiate within themselves. However, in some studies, it is perceived that health services represent a

luxury good. Another essential point is that in the presence of high human capital levels, the favorable consequences of healthcare expenditures on the economy are strengthened. In this direction, it is emphasized in academic studies that the developments in the field of medicine, which are the output of the increase in the R&D activities of the health sector and the prolongation of human life, as effective factors in healthcare expenditures.

In most of the studies in the literature, it is concluded that there is a positive relationship between health expenditures and economic growth. Likewise, many studies have determined there is a mutually positive relationship between health expenditures and economic growth in studies dealing with the causality relationship. However, some studies have determined there is no significant relationship between health expenditures and growth. There are even studies in the literature that have determined a negative relationship. Below, we will first give examples of empirical studies that differ from the literature in general.

In their study conducted in 2003, Taban and Kar discussed the correlation among public economic growth and expenditures in Turkey between the years 1971 and 2000. In general, contrary to the prevailing opinions in the literature, it has been stated in the study that healthcare expenditures have a negative relationship with economic growth (Kar & Taban, 2003).

In their 2004 paper, Rivera and Currais discussed the effects of public healthcare expenditures on economic growth in Spain. In the study, besides the effect of public healthcare expenditures on economic growth, the effect of healthcare expenditures on productivity was also examined. However, it was stated that despite the positive effect on growth, a significant outcome of public healthcare expenditures on productivity could be undetermined (Rivera & Currais, 2004, p. 871).

Yumuşak and Yıldırım (2009) dealt with health indicators as one of the determinants of development and examined the relationship between healthcare expenditures and life expectancy at birth for the years 1980–2005 in Turkey with income level. However, the results of the study indicated there is a weak and negative correlation between healthcare expenditures and income (Yumuşak & Yıldırım, 2009, p. 57).

Çetin and Ecevit, in their panel analysis of the OLS method in 2010, explained that there is not any statistically significant correlation between economic growth and healthcare expenditures for the period 1990–2006 for 15 OECD countries. (Çetin & Ecevit, 2010, p. 166). Similarly, in his article, Hartwig (2010), in which he addressed the problem of whether health capital formation affects GDP growth in high-income countries within the framework of Granger-causality, concluded that health capital accumulation does not stimulate long-term economic growth (Hartwig, 2010, p. 314).

In the economics literature, we see there are predominantly studies that determine a positive relationship between health expenditures and economic growth. These studies also indicate the relationship is reciprocal. While the improvement in health status leads to an increase in economic growth, the increasing income level with economic growth also positively affects the benefit from the provision of health services. However, there are, moreover, studies stating that health services have the quality of luxury goods. This situation increases the importance of public health expenditures for disadvantaged groups with limited incomes. Spreading access to health services, especially in

underdeveloped and developing countries, assumes strategic importance.

As a result of the Granger causality test conducted in 2004, Erdil and Yetkiner determined the existence of bidirectional causality between GDP and per capita healthcare expenditures and reached conclusions that support the view that economic growth and healthcare support one another (Erdil & Yetkiner, 2004, p. 716).

Kar and Ağır (2006) determined the presence of a long-term correlation between growth and human capital in the cointegration approach in which the portion of health and education expenses in income between 1926 and 1994 was used. In the study, it is emphasized that long-term growth provides a high sensitivity to human capital expenditures (Kar & Ağır, 2006, p. 64).

Kiyamaz et al., in their published study conducted in 2007, unlike other studies, focused on the high-income flexibility of healthcare expenditures and therefore defined healthcare expenditures as a luxury service (Kiyamaz et al., 2007, p. 285).

In the published results of the Johansen multivariate cointegration analysis applied by Sülkü and Caner (2011) for the 1984–2006 period in Turkey, a 10% extension in per capita GDP leads to an 8.7% expansion in entire healthcare expenditures per capita. It can be stated that this result supports the view that healthcare services are close to representing luxury goods (Sülkü & Caner, 2011, p. 29).

Tatoğlu (2011), in his study examining the short and long-term correlation between economic growth and human capital investment in OECD countries between 1975 and 2005, concluded that the expansion in healthcare expenditures leads to a rise in economic growth for all countries in the short and long term (Tatoğlu, 2011, p. 77).

Kuhn and Prettnner (2016) stated that while health services increase life expectancy, labor force participation, and productivity, they are Pareto optimum beyond the level that maximizes growth (Kuhn & Prettnner, 2016, p. 100).

Selim et al. (2014) discussed the direct relationship between human capital and economic growth between the years 2000 and 2011 through the healthcare expenditures component in their published study conducted in 27 European Union member countries. As in many similar studies, it was ended in this academic study that there exists a favorable correlation between economic growth and per capita healthcare expenditure in the long and short run (Selim et al., 2014, p. 13). Similarly, Hayaoğlu and Bal, using the historical data of 54 upper-middle-income countries for the years between 2000 and 2013, reached that the significant increase in private and public sector healthcare expenses increased economic growth (Hayaoğlu & Bal, 2015, p. 35).

Cebeci and Ay (2016), in their academic research including BRICS countries and Turkey for the 2000–2014 period, concluded that healthcare expenses have a significantly favorable outcome on economic growth (Cebeci & Ay, 2016, p. 92).

Saraçoğlu and Songur concluded there exists a duplex causality correlation between per capita national income and per capita healthcare expenses, unlike the studies on high-income countries for 10 Eurasian countries for the 1995–2014 period (Saraçoğlu & Songur, 2017, p. 354).

Kılıç and Özbek, in their study in 2018, concluded that there is a positive correlation between human capital expenditures and economic growth in OECD countries included including education expenditures as well as healthcare expenditures between 1995 and 2013 (Kılıç & Özbek, 2018, p. 369).

In their study in 2020, Sethi et al. aimed to examine the possible outcomes of healthcare expenditures on the South Asian countries' economic growth between the years 1996 and 2018. The satisfactory results revealed that in the short term, and there was a bidirectional causality running from healthcare spending to economic growth in South Asian countries (Sethi et al., 2020, p. 1).

Shen et al. (2020), in their study with the help of data obtained from 31 provinces in China, concluded that public health investments cause positive effects on economic growth. However, he also stated the results included regional differences. It is also stated in this study that the difference created by regional development differences in income level is also reflected in the correlation between economic growth and healthcare expenses (Shen et al., 2020, p. 684).

Yang (2020) analyzed the correlation between economic growth and national healthcare expenditures in 21 developing countries between the years 2000 and 2016 at diverse levels of human capital and concluded that different effects are seen at diverse levels of human capital. The striking result of the study is that at moderate levels of human capital, healthcare expenditures are significantly negatively correlated with economic growth (Yang, 2020, p. 163).

Konatar et al. (2021), in a study of Central and Eastern European countries covering the years 2000–2018, discovered a statistically significant and long-term relationship between income and healthcare expenditures, medical progress, population aging, and financial capacity. In parallel with similar studies in the literature, it has been determined healthcare expenditures are sensitive to income levels and the income flexibility of health is close to each other (Konatar et al., 2021, p. 750).

Qehaja et al. (2023), using the data from the Balkan geography between 2000 and 2020, aimed to examine the effects of factors such as life expectancy, average age, public healthcare expenses, and death rates on economic growth. The consequences of the research verify the conclusion that government expenditures in the field of health encourage higher economic growth rates (Qehaja et al., 2023, p. 10).

When we look at the literature on the relationship between economic growth and healthcare expenditures, we see studies that conclude that healthcare expenditures, which represent an improvement in human capital, cause a positive effect on growth. Some of the published studies dealing with human capital expenditures include education expenditures as well as healthcare expenditures. These studies also support those investments in human capital, in proportion to the general trend, contribute to the increase in growth. Despite these views, there are also studies in the literature that have determined that healthcare expenditures do not have an effect on economic growth. It is also revealed that the effect of healthcare spendings varies in various countries and even in different regions of the similar country in different periods. Income level differences created by regional development differences also affect the economic contribution of healthcare expenditures. Many studies indicate the income

flexibility of healthcare expenses is close to one. In this context, the view that public healthcare expenditures are more meaningful for the low-income people of less developed regions is reinforced. It can be stated that the observance of public health with public healthcare spendings has greater importance compared to developed regions within the framework of variables like life expectancy at birth, work efficiency, and length of stay in working life, which affect the economic results in terms of developing countries and regions. In developed countries, the proportion of the population that has the chance to benefit from increasingly expensive health services corresponds to a higher percentage than in developing countries. It indicates the lack of an essential need for poor regions, which lack the widespread health insurance system of health services, which represent luxury goods. Therefore, the influence of healthcare expenses in underdeveloped and developing countries is expected to be even more significant.

The following part of this academic study, which aims to carefully examine the possible effects of the favorable outcome of public healthcare expenses on economic growth in upper middle-income countries with higher fragility, presents the data and methods to be accustomed to the objective assessments. In the third part, the remarkable outcomes of the research are given.

Methods

In this study, the effect of healthcare expenditures on economic growth was examined with the help of the panel data analysis method by using annual data for 25 upper middle-income countries, including Turkey, for the period of 2000–2019. Within the scope of panel data analysis, it is decided which of the fixed and random effects methods will be used, by looking at the characteristics of the analyzed sample and the Hausman test result. In this direction, it has been revealed that the most appropriate method is the fixed effects model according to the characteristics of the country group subject to the analysis and the findings obtained from the Hausman test.

The following econometric model was used to accurately measure the meaningful impact of independent factors on economic growth:

$$GDP = \alpha + \beta_1(\text{domestic general government healthcare expenditure per capita}) + \beta_2(\text{gross fixed capital formation}) + \beta_3(\text{employment to population ratio, 15+}) + \mu_i$$

In the analysis performed, the constant parameter was considered heterogeneous, and the slope parameter was considered homogeneous. A static model has been established that assumes the slope parameter is constant. The countries in the model are listed in Table 1. The income level of the countries included in the upper middle-income group is between 7250 and 11,750 dollars.

Table 2 demonstrates the depiction of four variables (independent and dependent) applied in this academic study. To eliminate the scale differences in the model, the logarithm of the three variables (gdp, dgghe, and gfcf) was taken. Table 3 demonstrates the brief statistics of the variables of the model. Due to the scale differences, the logarithm of the three variables (gdp, dgghe, and gfcf) was taken.

Table 4 shows the ANOVA table. All the variables are meaningful.

The correlation coefficients of the variables applied in the research are given in Table 5. In the table, it is obvious that there is a positive correlation between the lddghe, lgfcf, and emp variables and

Table 1.
Countries in the Model

Countries				
Argentina	El Salvador	Türkiye	Ecuador	Malaysia
Brazil	Guatemala	Algeria	Gabon	Peru
Bulgaria	Romania	Bosnia Herzegovina	Lebanon	Serbia
Colombia	Russia	Belarus	Namibia	Thailand
Costa Rica	South Africa	China	Mexico	Tunisia

the lgdp levels of the countries. Besides, there is a negative correlation between lddghe and emp variables. Since all variables are significant, they can be included in the model. Furthermore, the correlation matrix is given in Table 5. There is a positive correlation of about 27% between lddghe and lgdp, about 99% between lgfcf and lgdp, about 44% between emp and lgdp, about 25% between lddghe and lgfcf, and about 42% between lgfcf and emp. However, there is approximately 17% negative correlation between emp and lddghe.

The variance growth factor is a criterion calculated with the help of the values obtained from the auxiliary regression models in which the independent variables in the model are one by one dependent variable and the remaining independent variables represent independent variables (Yerdelen Tatoğlu, 2020, p. 260).

When we look at the VIF values to test whether there is multicollinearity in the model, we conclude there is no multicollinearity in the model because the VIF criterion is less than 5. The VIF criteria values of independent variables are given in Table 6.

LR, F, and LM tests were performed to decide whether there are unit and time effects in the model. The bidirectional LR test gave the result that there is a unit or time effect. As a result of the LR test, in which only the unit effect was tested, the H_0 hypothesis was rejected, and it was concluded that there was a unit effect. In the LR test, where the time effect is tested, the H_0 hypothesis was rejected, and it was concluded that there was a time effect. As a result of the double-sided F test, it was concluded that there is a unit or time effect. As a result of the one-way F test, in which the unit effect was tested, it was concluded that there was a unit effect. Likewise, because of the F test, in which the one-way time effect was tested, the H_0 hypothesis was rejected, and it was concluded that there was a time effect. The test results are summarized in Table 7. According to the results of the LM test, which predicts one-way models, it was concluded that while there is a unit effect, there is no time effect. Since two of the three tests said that there is a unit and time effect, the extended Hausman test was used to decide on the appropriate estimator in the case of two-way models.

Table 8 shows the extended Hausman test results. Since H_0 is rejected according to the Hausman test result, it is decided that at least one of the unit and time effects is nonzero. For this reason, the hypotheses that the unit and time effects are random, independent of the other effect, were tested. According to the test results, since H_0 was rejected in both tests, it was concluded that the two-way fixed effects model was valid.

Deviations from the assumption regarding the fixed effects model are shown in Table 9. The error terms in the model are normally distributed. Driscoll–Kraay estimator was used in the model since there was a deviation from inter-unit correlation and autocorrelation assumptions.

Table 2.
Description of Variables

Variables	Dependent/Independent	Shortcuts	Origin	The Measure
1 GDP	Dependent	gdp	World Bank	Current US\$
2 Domestic general government healthcare expenditure per capita	Independent	dgghe	World Bank	Current US\$
3 Gross fixed capital formation	Independent	gfcf	World Bank	Current US\$
4 Employment to population ratio, 15+	Independent	emp	World Bank	Percentage of population

Table 3.
Summary Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
gdp	500	5.36e+11	1.58e+12	3.35e+09	1.43e+13
dgghe	500	217.4919	151.5315	9.254323	1021.71
gfcf	500	1.69e+11	6.64e+11	6.48e+08	6.12e+12
emp	500	52.48612	11.17692	29.395	76.895

Table 4.
Analysis of Variance Table

Source	SS	df	MS		
Model	1416.84686	3	472.282288	Number of observations = 500 F(3, 496) = 9131.20 Probability > F = .0000 R ² = 0.9822 Adj R ² = 0.9821 Root MSE = .22742	
Residual	25.654014	496	.051721802		
Total	1442.50088	499	2.89078332		
lgdp	Coefficient	Standard Error	t	p > t	95% Confidence Interval
ldgghe	.0674031	.0146351	4.61	.000	.0386487 .0961576
lgfcf	.9305111	.0068649	135.55	.000	.9170232 .9439991
emp	.004722	.0010675	4.42	.000	.0026246 .0068194
_cons	2.581456	.1420286	18.18	.000	2.302404 2.860508

Results

In the fixed effects model, the Driscoll–Kraay estimator was used, which causes more resistant estimators due to heteroscedasticity, autocorrelation, and cross-section dependence. The Driscoll–Kraay estimator makes a Newey–West type correction for the series of cross-sectional means. Corrected error terms in this way ensure consistency of covariance matrix estimators regardless of cross-section size. Thus, the Driscoll–Kraay estimator produces consistent standard faults in the existence of heteroscedasticity for fixed and random effects models, and resistant standard errors in the general forms of spatial and periodic correlation (Tatoğlu, 2011, p. 335).

According to (Table 10) *t* statistics, two parameters ldgghe and lgdcf were significant, while emp was insignificant. F-test generated significant results. The F model is significant. The R² is around

97%. The variability in the independent variables of the model explains the variability of the dependent variable at an average rate of 97%. A high R² ratio indicates the independent variables are sufficient. The probability values of the ldgghe, lgdcf, and cons are smaller than the margin of error of $\alpha = 0.05$ ($p < .05$). Every 1% increase in domestic general government healthcare expenditure per capita increases the gross domestic product (GDP) by 38%. The lower limit value of the 95% confidence interval for the mean difference value of domestic general government healthcare expenditure was found to be 0.2874138, and the upper limit value was 0.4781403. All other variables being constant, every 1% increase in gross fixed capital formation extends the GDP by 49%. The lower limit value of the 95% confidence interval for the mean difference value of gross fixed capital formation was found to be 0.3885322, and the upper limit value was 0.5929192. The lower limit value of the 95% confidence interval for the mean difference

Table 5.
Correlation Matrix

Variables	lgdp	ldgghe	lgfcf	emp
lgdp	1.0000			
ldgghe	0.2755	1.0000		
lgfcf	0.9905	0.2587	1.0000	
emp	0.4413	-0.1759	0.4287	1.0000

Table 6.
VIF Values

Variable	VIF	1/VIF
ldgghe	1.43	0.701028
lgfcf	1.37	0.728055
emp	1.20	0.832325
Mean VIF	1.18	

Table 7.
LR, F and Test Breusch and Pagan Lagrangian Multiplier Tests Results

LR, F, LM Tests	Tests Results
LR test vs. linear model: $\chi^2(2) = 858.41$ Probability $> \chi^2 = .0000$	H_0 hypothesis is rejected. There is a unit or time effect.
LR test vs. linear model: $\text{chibar}^2(01) = 780.27$ Probability $\geq \text{chibar}^2 = .0000$	H_0 hypothesis is rejected. There is a unit effect.
LR test vs. linear model: $\text{chibar}2(01) = 16.06$ Probability $\geq \text{chibar}^2 = .0000$	H_0 hypothesis is rejected. There is time effect.
F-Test Coefficients F(3, 451) = 856.69 8.61e-186 All Fes F(44, 451) = 8.56 3.478e-37 FE country F(25, 451) = 152.79 2.20e-202 FE year F(20, 451) = 4649.64 0	$H_0 : \frac{1}{4} = \frac{1}{4} \Rightarrow H_0$ hypothesis is rejected. 3.478e-37 < 0.05 There is a unit or time effect.
F test that all $u_i = 0$: F(24, 472) = 123.00 Probability $> F = 0.0000$	H_0 hypothesis is rejected. There is a unit effect.
F test that all $u_i = 0$: F(19, 477) = 3.69 Probability $> F = 0.0000$	H_0 hypothesis is rejected. There is time effect.
Breusch and Pagan Lagrangian multiplier test for random effects $\text{chibar}^2(01) = 1988.92$ Probability $> \text{chibar}^2 = 0.0000$ $\text{chibar}^2(01) = 0.00$ Probability $> \text{chibar}^2 = 1.0000$	H_0 hypothesis is rejected. There is a unit effect. H_0 hypothesis cannot be rejected. There is no time effect.

Table 8.
The Extended Hausman Test Results

Hausman Test	Test Results
$\chi^2(3) = 108.21$ Probability $> \chi^2 = .0000$	H_0 : at least one effect is correlated with the independent variable. $H_0: E(\lambda_t X_{it}) = E(\mu_t X_{it}) = 0$ H_0 hypothesis is rejected.
Score test of $\sigma_u = 0$: $\chi^2(1) = 111.40$ Probability $\geq \chi^2 = .000$	$H_0: E(\mu_t X_{it}) = 0$ H_0 hypothesis is rejected.
Score test of $\sigma_u = 0$: $\chi^2(1) = 111.40$ Probability $\geq \chi^2 = .000$	$H_0: E(\lambda_t X_{it}) = 0$ H_0 hypothesis is rejected.

Table 9.
Deviations from the Assumption in the Fixed Effects Model

Assumptions	Tests	Test Results
Normal distribution	Jarque-Bera normality test: .4536 Chi(2) .7971	H_0 hypothesis cannot be rejected. The error terms are normally distributed.
Heteroscedasticity	Modified Wald test for groupwise heteroscedasticity in fixed effect regression model $H_0: \sigma(i)^2 = \sigma^2$ for all i $\chi^2(20) = 24.49$ Probability $> \chi^2 = 0.2214$	H_0 hypothesis cannot be rejected. There is no heteroscedasticity
Inter-unit Correlation	Pesaran's test of cross-sectional independence = 11.315, Pr = 0.0000 Friedman's test of cross-sectional independence = 84.760, Pr = 0.0000 Frees' test of cross-sectional independence = 3.850 Critical values from Frees' Q distribution $\alpha = 0.10 : 0.1294$ $\alpha = 0.05 : 0.1695$ $\alpha = 0.01 : 0.2468$	H_0 hypothesis is rejected. There is inter-unit correlation
Autocorrelation	F test that all $u_i = 0$: F(24,447) = 31.93 Probability $> F = .0000$ modified Bhargava et al. Durbin-Watson = .35850883 Baltagi-Wu LBI = .54456957	There is autocorrelation.

value of the constant was found to be 9.723218, and the upper limit value was 13.54014. When the other variables take the value 0, the GDP of the constant variable takes a value of about 11%. The probability values of the emp are higher than the margin of error of $\alpha = 0.05$ so the emp parameter is not significant.

Discussion

Primary indicators of health are measured by factors such as mortality rates, infant and child mortality rates, life expectancy at birth, and disease measures. The physical and social environmental conditions, demographic characteristics, and ultimately access to health services determine these indicators. In today's modern world, it is the macroeconomic indicators of the country that directly and indirectly affect all these factors. While environmental factors cover issues like infrastructure, clean water supply, need for shelter, and environmental pollution, demographic characteristics have content like social class, migration, and gender. Along with all these factors, access to health services deeply affects health status. While the developments in the field of industrial medicine made it possible to treat many diseases, they also brought price increases. All these factors affecting the health status are directly and indirectly related to the macroeconomic indicators of the country. The increase in GDP, trade volume, working conditions, wage level, and monetary and fiscal policy preferences affect social capital in the health system. It is a widely accepted view in the economics literature that there is a reciprocal relationship between the improvement in health status and the ease of access to health services and economic growth targets. With the widespread use of endogenous growth models focusing on human capital expenditures in the academic literature, the marked increase in productivity created by health status in business circles has naturally begun to be expressed more widely.

Contrary to neoclassical growth theories, which have been the dominant view in the economic growth literature for many years, endogenous growth models, which gained popularity after the 1980s, considered human capital as the most critical factor affecting growth. Endogenous growth models also focus on the notable differences in economic growth and income levels between

Table 10.
Regression With Driscoll–Kraay Standard Errors

						Number of observations = 500 Number of groups = 25 F (3, 19) = 2490.32 Probability > F = .0000 within R ² = 0.9719	
Method: Fixed-effects regression Group variable (i): country maximum lag: 2							
lgdp	Driscoll/Kraay Coefficient	Standard Error	t	p > t	95% Confidence Interval		
ldgghe	.382777	.0455624	8.40	.000	.2874138	.4781403	
lgfcf	.4907257	.0488258	10.05	.000	.3885322	.5929192	
emp	.0018868	.0016844	1.12	.277	-.0016388	.0054124	
cons	11.63168	.9118205	12.76	.000	9.723218	13.54014	

developing and developed countries. Healthcare is defined as a critical factor in explaining growth and income inequalities and as one of the essential needs for people to be productive. The increasing importance of funding human capital for economic growth in today's economies can be associated with the fact that innovation remains the most significant source of welfare increase. The fact that human creativity comes to the fore and intellectual property rights increase competitiveness at national and international levels has brought human capital-oriented investments to a more essential point. The direct connection of productivity growth with both education and healthcare expenditures also refers to this point. The change in human capital is of enormous importance for both short-term and long-term goals of national economies. Considering human creativity is the starting point of products with the highest added value, we can say that investments to be made in areas that will increase the quality of human capital like education and health will lead to enormous changes in economic growth. Individuals whose opportunities for their most fundamental needs are expanded will have the chance to be more productive in economic terms. We can state that variables like length of stay in working life, work efficiency, and average life expectancy are directly related to investments made in the field of health and the prevalence and quality of health services.

In our study, in which we analyzed 19 years of data from 25 upper middle-income countries, we concluded there was a strong and positive correlation between growth rate and public healthcare expenditures per capita, consistent with the latest findings in the literature. In the study, national general government healthcare expenditure per capita was applied as an indicator of healthcare expenses. Gross fixed capital formation and employment-to-population ratio variables were used as explanatory variables in the model. As an outcome of the extended Hausman test, it was decided that the model was suitable for the two-way fixed effects model. In the fixed effects model, the Driscoll–Kraay estimator was used because of the deviation from the basic assumptions. According to the results of the model, there is a certain correlation between economic growth and public healthcare expenditures. Every 1% rise in domestic general government healthcare expenditure per capita increases growth by about 38%. Considering most of the upper middle-income countries are more likely to be captured in the middle-income trap, the importance of public expenditures on human capital such as health and education becomes even more evident. With the developments in the field of medicine, the application of many new treatment methods, and the developments that will ensure a longer and higher quality of human life, depending on the industrial medicine approach,

health services are becoming more expensive and have the quality of luxury goods. For this reason, we can say that public healthcare expenditures assume critical importance in countries with low-income populations. In other words, the results of the analysis reveal that investments in health by the public sector favorably impact economic growth in upper middle-income countries.

With the popularization of neoliberal policies, which started in the 1980s, as the dominant view in the global economy, the services attributed to the public and the resources allocated to these services have become scrutinized. In the process that started with the abandonment of Keynesian policies, there was a gradual reduction in public expenditures for disadvantaged groups. With the balanced budget target, it has become common that the public has contracted in human capital expenditures like education and health and that such services are transferred to the initiative of the private sector. Today, the proportion of the private sector in the provision and financing of health services is gradually increasing. The neoliberal view advocates transferring the public health responsibility of the state to the market mechanism and focuses on the effective use of national resources. The reorganization of the questions of how many health services society needs will be produced by whom and by which technological methods, in terms of resource use, has remained the focus of policy discussions. The extent to which various segments of society can benefit from health services remains the point that public health-oriented views focus on and criticize neoliberal policies.

The use of scarce resources to provide access to the services needed by society is valid in the health sector as in other sectors. Since the production and distribution activities in the health sector are affected by the rapidly increasing input price levels, inefficiency in the health sector can occur in both developed and developing countries. However, it can be stated that if health services turn into a luxury commodity, all national resources, especially public health, will be adversely affected.

The health market obtains a unique structure due to factors like the uncertainty of health services, the effect of health insurance, the availability of asymmetric information of the parties regarding the health service, and limitations on the competition. The existence of this unique structure causes it to exist as a unique study area. However, since health is a basic human need, health services contain a social feature. In connection with this situation, non-profit organizations also operate in the field of health. And just like in the field of education and security, the state has a contribution and a significant role to play. In the understanding of the social state, it is advocated that access to health services should be made possible not only at lower levels but

also at higher levels. In this direction, it is discussed that public health policies should be aimed at eliminating social inequality in health services. In other words, it is stated that while taking care of public health, it should not be for-profit and health care should be based on need rather than the ability to pay. Neoliberal health policies, which are criticized for focusing on being profit-oriented in health services, are criticized for being far from taking care of public health with this feature. Especially in the Anglo-Saxon geography, where neoliberal policies are widely applied, the health system may be deprived of many health services for disadvantaged groups who have payment difficulties. On the other hand, despite this neoliberal view, which obtains a response in the Anglo-Saxon geography, there are also Germany and Northern European countries that have adopted more social policies in health services. The existence of reluctant countries to leave the health sector entirely to the market mechanism is based on the view that health and education services are fundamental human rights and need. Experiences during the COVID-19 pandemic have also shown a public response to market disruptions is necessary. In countries with low-income levels compared to developed Western countries, it does seem not possible to achieve effective access to health services without public regulation. In this direction, in our study, we intend to contribute to the ongoing discussion by emphasizing the beneficial impact of public healthcare spending per capita on growth.

Some studies in the literature on the efficiency of public health expenditures yield diverse results. In most cases, although there are predominantly studies that discover a positive relationship between growth and health expenditures, there are also studies that conclude that public expenditures have a negative or no effect on sectoral productivity. There is a consensus in the literature that the importance of public health expenditures in terms of public health and macro indicators varies depending on the level of development of the country. Since differentiations are observed both at the level of national economies and various regions of the country, it can be said that it would be healthier to evaluate the relationship between public expenditures and economic growth within the framework of the region or national economy. This study contributes to the criticism of neoliberal policies to reduce public health expenditures by emphasizing the importance of public health expenditures on economic growth in developing economies. The empirical results of our study confirm the view that public health expenditures are critically important for economic growth in underdeveloped and developing countries. The negative impact of neoliberal policy implementations, which have policy preferences to minimize expenditure items like health and education, on the macroeconomic indicators in countries with low incomes can also create a negative picture in terms of macroeconomic indicators. Reconsidering the negative impact that the acceleration of industrialization in the field of medicine, which has been implemented in developing countries, especially since the 1980s, may have on public health and strengthening more welfare state practices in these countries may positively affect the health processes of individuals in both the medium and extended term and eliminate the negative impact on economic growth. As a matter of fact, the financial and moral pressure of health insurance-based health service procurement on low-income individuals is also observed in developed countries. While expanding access to health services at the grassroots level by using public resources means improving the quality of life at the level of the whole society, the damage that a policy based solely

on efficiency would cause to the economic processes of developing economies should be unignored.

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Genişletilmiş Özet

Amaç: Çalışmada 2000–2019 döneminde iktisadi anlamda daha kırılgan bir yapıya sahip olan 25 üst orta gelirli ülkeye ait verileri kullanarak kamu sağlık harcamalarının diğer bir deyişle kamu sağlık finansmanının iktisadi büyümeye olan katkısı analiz edilmeye çalışılmıştır. Sağlık harcamalarının iktisadi büyüme üzerindeki etkisinin araştırılmasındaki motivasyon noktası 2008 krizinin ortaya çıkardığı piyasa aksaklıklarına benzer bir biçimde COVID-19 pandemisinde küresel sağlık sisteminde yaşanan sorunlardır. Çalışmada üst orta gelirli ülkelerin analiz edilmesinin tercih nedeni ise endüstriyel tıp alanındaki gelişmelere paralel olarak gerçekleşen sağlık hizmetlerindeki fiyat artışlarının bu ülkelerde sağlık hizmetlerine erişimi gelişmiş ülkelere nazaran daha fazla etkilemiş olmasıdır. Dolayısıyla gelişmekte olan ülkelerin kırılgan yapısı sağlık politikası tercihlerinin toplumsal sağlık üzerindeki etkisini ön plana çıkarmaktadır. Liberal politika tercihlerine karşın sosyal devlet olgusunun ön plana çıkması toplum sağlığı sorunu nedeni ile önem kazanmaktadır.

Yöntem: Çalışmada sağlık harcamaları göstergesi olarak, kişi başına ulusal genel devlet sağlık harcaması kullanılmıştır. Modeldeki açıklayıcı değişkenler ise gayri safi sabit sermaye oluşumu ve istihdamın nüfusa oranıdır. Sabit ve tesadüfi etkiler modellerinden hangisini tercih etmemiz gerektiğinin tespiti için Genişletilmiş Hausman testi uygulanmıştır. Genişletilmiş Hausman testi sonucunda modelde hem birim hem de zaman etkisi tespit edilmiştir. Analiz için iki yönlü sabit etkiler modelinin uygun olduğuna karar verilmiştir. Sabit etkiler modelinde temel varsayımlardan ikisinde sapma tespit edilmiş olması nedeniyle Driscoll–Kraay tahmincisi kullanılmıştır. Driscoll–Kraay tahmincisi heteroskedastite varlığında çeşitli korelasyonun formlarına karşın dirençli standart hatalar üretebilme özelliğiyle sabit ve tesadüfi etkiler modellerinde de kullanılabilir. Modelde de kullanılabilmektedir.

Bulgular: Driscoll–Kraay tahmincisi sonuçlarına göre modeldeki kişi başına ulusal genel devlet sağlık harcaması parametresi ve gayri safi sabit sermaye oluşumu parametresi anlamlıyken, istihdamın nüfusa oranı parametresi anlamsızdır. Modelin bağımsız değişkenlerindeki değişkenlik, bağımlı değişkenin değişkenliğini ortalama %97 oranında açıklamaktadır. Diğer tüm değişkenler sabitken, kişi başına Yurtiçi genel devlet sağlık harcamalarındaki her yüzde birlik artış, Gayri Safi Yurtiçi Hasıla'yı %38 artırmaktadır. Diğer tüm değişkenler sabit iken, Gayri Safi Sabit Sermaye Oluşumundaki her yüzde birlik artış, Gayri Safi Yurtiçi Hasıla'yı %49 artırmaktadır. Diğer değişkenler 0 değerini aldığı anda, sabit değişkenin Gayri Safi Yurtiçi Hasıla yaklaşık %11'lik bir değer almaktadır. Modelin sonuçlarına göre, kamu sağlık harcamaları ile ekonomik büyüme arasında pozitif yönlü bir ilişki mevcuttur. Diğer bir deyişle yapılan analizin sonuçları kamu sektörü tarafından yapılan sağlığa yönelik yatırımların üst orta gelirli ülkelerde ekonomik büyümeyi olumlu etkilediğini ortaya koymaktadır. Çalışmadan elde edilen sonuçlar literatürde gelişmekte olan ülkeler açısından beşeri sermayeye yönelik yatırımların verimlilik artışına yol açtığı sonucunu destekler niteliktedir. Beşeri sermayenin verimliliğine doğrudan fayda sağlayan eğitim ve sağlık harcamalarının tüm ekonomideki topyekün bir gelişme trendini temsil eden Gayri Safi Yurtiçi Hasılada artış yaratması, hem doğumda yaşam beklentisi verilerinde düzelmeye yol açarken, sağlıklı bir bireyin çalışma hayatında daha uzun süre yer almasını da sağlamaktadır. Bununla birlikte Endüstriyel tıp alanındaki gelişmelerin etkisi ile birçok hastalık ölümcül olmaktan çıkmaktadır ancak AR-GE harcamalarının ve artan girdi fiyatları ile sağlık hizmetlerinin sunumundaki fiyat artışlarının hızlı bir yükseliş trendi içinde girmesi farklı gelir düzeylerindeki bireyler arasında sağlıkta eşitsizlik sorununun ortaya çıkmasına yol açmaktadır. Sağlık hizmetleri piyasasında yaşanan aksaklıklarının devletin ana belirleyici rolü olmaksızın çözülebilmesi özellikle gelir düzeyi düşük ülkelerde mümkün görünmemektedir. Dolayısıyla Kişi başına düşen kamu harcamalarının iktisadi büyüme ile ilişkisi hem tedavi süreçleri açısından hem de önleyici tıp uygulamaları açısından önemli bir kazanca işaret etmektedir. Gerçekleştirdiğimiz bu çalışmada ele alınan ülkeler söz konusu kazanımlar açısından kamu sağlık finansmanına ihtiyaç duyan ülkelerdir. COVID-19 pandemisi gibi beklenmedik büyük ölçekli sağlık krizi de kamu sağlık finansmanının gerekliliğini gösteren bir deneyim niteliğindedir.