ARAŞTIRMA MAKALESİ | RESEARCH ARTICLE

KIRILGAN BEŞLİ EKONOMİLERDE EĞİTİM VE SAĞLIK HARCAMALARININ EKONOMİK BÜYÜME ÜZERİNDEKİ ETKİSİ

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Öz

Neo-Klasik iktisadın yakınsama hipotezine yönelik öngörülerinin başarısız olması nedeniyle içsel büyüme modelleri ekonomik büyümeyi açıklamak için alternatif makroekonomik parametrelere yönelmektedir. Söz konusu alternatif makroekonomik parametrelerin içerisinde ise eğitim ve sağlık harcamalarının artırılması ile birlikte toplumun refah seviyesinin ve toplam faktör verimliliğinin artırılması amacı yatmaktadır. Bu çalışmada 2004-2021 yılları arasında kırılgan beşli ülkelerinde eğitim/sağlık harcamalarının ekonomik büyüme üzerine etkisi incelenmektedir. Her üç değişkende yatay kesit bağımlılığı ve düzey değerinde birim köke sahiptir. Kısa dönemde eğitim/sağlık harcamaları ile ekonomik büyüme arasında karşılıklı, eğitim harcamalarından sağlık harcamalarına doğru nedensellik tespit edilmektedir. Hata düzeltme katsayılarına göre sağlık harcamalarının büyüme üzerinde etkisinin daha uzun dönemde ortaya çıktığı ve hasıla döngülerinden daha az etkilendiği görülmektedir. Ülke bazında ise yalnızca Güney Afrika'da sağlık harcamalarından, Brezilya ve Güney Afrika'da eğitim harcamalarından hasılaya doğru nedensellik bulunmaktadır. Son olarak hiçbir ekonomide hasıladan sağlık harcamalarına doğru nedensellik yokken, yalnızca Türkiye'de hasıladan eğitim harcamalarına doğru nedensellik bulunmaktadır. Bu nedenle Brezilya'da sosyal transferlerin odak olarak yer aldığı kamu harcamalarının olduğu, Güney Afrika'da tarihsel süreçte yaşadığı eşitsizlikler ve sağlık sorunlarının çözümüne yönelik kamu harcamalarının beşeri sermayenin verimliliğe dönüşünün olduğu, Hindistan ve Endonezya'da yarı saf kamusal mal üretimine yönelik harcamaların verimliliğinin düşük olduğu bulgusuna ulaşılmaktadır. Türkiye'de ise ekonomik refahın eğitime doğrudan yansımadığına yönelik bulgulara rastlanmaktadır.

Anahtar Kelimeler: Eğitim Harcaması, Ekonomik Büyüme, Sağlık Harcaması, Panel Veri

THE IMPACT OF EDUCATION AND HEALTH EXPENDITURES ON ECONOMIC GROWTH IN FRAGILE FIVE ECONOMIES

Abstract

After the failure of the neoclassical convergence hypothesis in explaining economic growth, endogenous growth models have focused on education and health expenditures as important determinants of economic growth. This study examines the effect of education and health expenditures on economic growth in the Fragile Five economies during the period 2004–2021. All three variables exhibit cross-sectional dependence and contain unit roots at their level values. In the short run, a bidirectional causality is observed between education/health expenditures and economic growth, along with a unidirectional causality running from education expenditures to health expenditures. According to the error correction coefficients, the effect of health expenditures on growth emerges in the long run and is less influenced by output cycles. At the country level, causality from health expenditures to output is found only in South Africa, while causality from education expenditures to output is observed in Brazil and South Africa. Finally, there is no evidence of causality from output to health expenditures in any of the economies, whereas causality from output to education expenditures is found only in Turkey. Therefore, it is concluded that in Brazil, public expenditures focus on social transfers; in South Africa, historical inequalities and public health spending have translated into human capital productivity; in India and Indonesia, the efficiency of expenditures directed toward quasi-public goods remains low. In Turkey, findings indicate that economic prosperity does not directly translate into increased investment in education.

Keywords: Economic Growth, Education Expenditure, Health Expenditure, Panel Data

INTRODUCTION

The economies of Turkey, Brazil, India, Indonesia and South Africa, referred to as the "Fragile Five" in the global economic system, exhibit a profile that is particularly vulnerable to macroeconomic shocks due to their structural fragility. These countries are defined by common characteristics such as high current account deficits, external financing dependency, inflationary pressures and institutional weaknesses (Morgan Stanley, 2013). These fragility factors threaten the sustainability of economic growth and bring about academic and political discussions on the role of human capital investments in long-term development strategies.

Human capital theory suggests that investments in education and health trigger economic growth through labor productivity, technological adaptation capacity and social welfare (Schultz, 1961; Becker, 1964). However, the dynamics of this relationship in the Fragile Five countries may differ from developed economies due to institutional deficiencies, asymmetries in resource distribution and macroeconomic instabilities. For example, the decrease in the real effect of health expenditures in a high inflation environment or the disruption of human capital accumulation due to quality problems in education systems are critical factors limiting the growth potential in these countries (Acemoğlu & Robinson, 2012).

This study aims to empirically examine the impact of health expenditures and education investments on economic growth in the Fragile Five economies.

1. THEORETICAL FRAMEWORK

1.1. Human Capital and Growth Theories:

The concept of human capital refers to the capacity of individuals to produce economic value through education, health, and skill development (Becker, 1964). Endogenous growth models developed by Romer (1990) and Lucas (1988) position human capital as the main driver of long-term growth by associating it with technological progress and economies of scale. According to these models, an educated workforce creates a "learning-by-doing" effect by

increasing the efficiency of R&D activities. Health expenditures, on the other hand, provide increased productivity by optimizing the physical and mental capacity of the workforce (Bloom et al., 2004).

However, this relationship may be interrupted in developing countries due to the weakness of institutional structures. For example, Acemoğlu and Robinson (2012) argue that in the absence of "inclusive institutions", the transformation of human capital investments into growth will be limited. In this context, factors such as corruption, bureaucratic inefficiency and political instability in Fragile Five countries should be considered as important obstacles that reduce the effectiveness of health and education policies (World Bank, 2021).

1.2. Macroeconomic Effects of Health Expenditures:

The effect of health expenditures on economic growth can be examined through three main channels:

a. Labor Productivity: Healthy individuals have higher working hours and physical/mental performance (Suhrcke & Urban; 2010).

b. Demographic Transition: Decreased infant mortality and increased life expectancy can change the demographic structure of the population and increase savings rates (Bloom et al., 2003).

c. Diffusion of Health Technologies: Public health infrastructure can trigger industrial growth by supporting private sector innovation (Goel &Gupta; 2021).

In the Fragile Five countries, Silva et al. (2018) found that public health expenditures in Brazil increased economic growth by 0.7% by reducing regional inequalities. In contrast, in South Africa, Mugizi and Matshaka (2022) found that the impact of health expenditure on GDP is only half that of developed countries due to institutional corruption.

1.3. Macroeconomic Effects of Health Expenditures:

The economic impact of education is directly related to the level of education (primary school, high school, university) and its quality (curriculum, teacher qualification). Hanushek and Woessmann (2012) empirically proved that a 1 standard deviation improvement in PISA scores increases the long-term growth rate by 2%. The example of India in the Fragile Five shows that technical and vocational education infrastructure increases manufacturing sector productivity by 15-20% (Rao & Singh; 2019). However, in Türkiye, Demir and Öztürk (2021) argue that personnel expenses, which constitute 70% of the education budget, remain inefficient due to the inadequacy of allocating sufficient resources to infrastructure investments.

1.4. Macroeconomic Effects of Health Expenditures:

Morgan Stanley (2013) explains the classification of these countries as "fragile" with their dependence on external financing and volatility in their currencies. In the post-COVID-19 era, Aizenman et al. (2022) found that economic recovery is 3-4% faster when health expenditure exceeds 1% of GDP. However, budget deficits in these countries lead to cuts in social spending, which hinders human capital investments (IMF, 2022).

2. LITERATURE REVIEW

Author(s)	Years	Country(ies)	Variable and Method	Results
Akıncı (2017)	2006-2017	Türkiye	This study, the relationship between education expenditures and economic growth was tested with time series analysis.	The findings showed that there was a statistically significant long-term relationship between the variables.
Altunöz (2020)	2000-2016	15 OECD countries	This study, the relationship between health expenditures and economic growth was tested with panel data analysis.	The findings showed that there was a positive and significant relationship between the variables.
Boussalem vd (2014)	1974-2014	Algeria	This study, the Granger Causality Test was used to test the relationship between health expenditures and economic growth.	The findings showed that there is a long-term relationship between the variables. It was found that public expenditures on health did not have a positive effect on economic growth.
Çetin & Doğan (2015)	1980-2011	Romania	This study tested the effect of education and health expenditures on economic growth with the Johansen Cointegration Test, Bounds test approach and Toda-Yamammoto causality test.	The findings showed that there is a long-term relationship between the variables and that these variables have a positive effect on economic growth.
Dinçer & Yüksel (2019)	1996-2016	E7 Countries	This study tested the relationship between health expenditures and economic growth using panel data analysis.	The findings concluded that there is a long-term relationship between the variables, but there is no causality relationship between health expenditures and economic growth.
Dudzevicute & Simelyte (2018)	1997-2016	Selected European Union countries	This study tested the relationship between education expenditures and economic growth by applying economic techniques within the scope of descriptive statistical analysis.	The findings showed that there was a statistically positive and significant relationship between the variables in the majority of the selected countries.
Eggoh vd (2015)	1996-2010	49 African Countries	This study tested the effect of education and health expenditures on economic growth with panel data analysis.	The findings showed that these variables have a negative impact on economic growth in Africa.
Hanif &	1960-2013	Member States	This study tested the	The findings showed

Arshed (2016)		of the Organisation for South Asian Cooperation	relationship between education expenditures and economic growth using panel data analysis.	that education, especially higher education, has a significant and positive relationship with economic growth.
Kar & Taban (2003)	1971-2000	Türkiye	This study tested the effect of public expenditures (education, health, social security, infrastructure) on economic growth with the cointegration approach.	The findings showed that the effect of education and social security expenditures on economic growth is positive, the effect of health expenditures is negative and the effect of infrastructure expenditures is statistically insignificant.
Mandiefe & Tieguhong (2017)	-	-	This study tested the relationship between health expenditures and economic growth through comparative analysis.	The findings show that health expenditures are the main determinant of economic growth of every country and that increasing these expenditures leads to higher growth rates.
Oğuz & Dinçer (2021)	2000-2018	OECD Countries	This study tested the effect of education and health expenditures on economic growth using panel data analysis.	The findings showed that a 1% increase in education expenditures resulted in a 0.11% increase in economic growth, while a 1% increase in health expenditures resulted in a 0.18% increase in economic growth.
Sağır & Kaplan (2024)	2000-2018	Türkiye	This study tested the relationship between health expenditures and economic growth with the ARDL bounds test.	The findings showed that there was a positive, significant and long-term relationship between the variables.
Wahab vd (2018)	1990-2015	Member States of the Organization of Islamic Cooperation	This study tested the effect of education and health expenditures on economic growth using panel data analysis.	The findings showed that there was a positive and long-term relationship between the variables.
Yakışık & Çetin (2014)	1980-2012	Türkiye	This study tested the effects of education (secondary and higher education enrollment rates), health (life expectancy) and technology level	The findings show that patents, life expectancy and secondary school enrollment rate have a significant and positive effect on

			(number of patents) on economic growth with the ARDL bounds test.	growth, while higher education has no effect.
Ali et al. (2016)	1982–2014	Pakistan	The study analyzed time series data (1982–2014) using GDP per capita as the dependent variable. Independent variables included higher education enrolment, physical capital, and labor force. The analysis employed ADF, Johansen co-integration, and Granger causality tests to examine relationships among variables.	The results revealed a long-run positive impact of higher education enrolment on economic growth. However, Granger causality tests showed a unidirectional relationship from GDP to higher education, not the reverse.

3. EMPRICAL RESULTS

In this study, the impact of education and health expenditures on economic growth in the Fragile Five countries during the period 2004–2021 is examined. In the empirical analyses, the variables used are gross domestic product at current prices in U.S. dollars (lnGDP), the ratio of education expenditures to gross domestic product (EE), and the ratio of health expenditures to gross domestic product (HE). The data are obtained from the World Bank database. The analyses involve the application of cross-sectional dependence (hereafter CSD), cointegration, and causality tests, respectively. The Pesaran et al. (PUY, 2008) LM test, on the other hand, is applied when the individual means deviate from zero while the panel mean is equal to zero. The LM test statistic is calculated as follows:

$$LM_{adj} = \sqrt{\frac{2}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=it1}^{N} \overline{TP_{ij}} \frac{(T-k)\widehat{P}_{ij}^2 - \mu_{Tij}}{\sqrt{v_{Tij}^2}}$$

where P^_ij^2 represents the average correlation coefficient between cross-sectional units.

Table 1. CSD Results

	lnGDP	HE	EE
CD_{lm} (BP,1980)	13.57 (0.193)	20.996 (0.021)[b]	19.026 (0.04)[b]
CD_{lm} (Pesaran, 2004)	0.799 (0.212)	2.459 (0.00)[a]	2.018 (0.022)[b]
CD (Pesaran, 2004)	-2.886 (0.00)[a]	-2.848 (0.00)[a]	-2.106 (0.018)[b]
LM_{adj} (PUY, 2008)	6.805 (0.00)[a]	0.261 (0.397)	0.823 (0.205)

p<0.01 a

In the CD and LMadj tests, the lnGDP variable is found to be significant at the 1% level; the HE variable is significant at the 5% level in the CDlm test and at the 1% level in the other CD tests, while the EE variable is significant at the 5% level in the CD tests. These findings indicate that the variables are socio-economically interdependent. The significance of CSD in lnGDP suggests that the output levels of the Fragile Five economies affect one another, and that their growth trajectories are closely aligned. Factors such as capital flows from international markets, similarities in trade structures and production patterns, and commonalities in monetary and

fiscal policies explain this interdependence. Furthermore, the countries' external debt ratios, financial market volatilities, and pressures on their national currencies contribute to a coordinated growth process (Şentürk et al., 2016). In the case of HE, the existence of CSD can be attributed to shared policies promoted by international health organizations and the similar shares of public budgets allocated to the health systems in these countries. Likewise, the dependence observed in EE may be explained by the comparable budget shares allocated to education and the relatively high proportion of young people within the total population.

Table 2. Smith et al. (2004) "bootstrap" Unit Root Test

	Constant		Constant and Trend	
Levels	Statistic	Bootstrap p-value	Statistic	Bootstrap p-value
lnGDP	-1.542	0.43	-2.184	0.46
HE	-1.946	0.15	-2.268	0.43
EE	-0.694	0.96	-0.990	0.99
First difference				
lnGDP	-3.088	0.00[a]	-4.258	0.00[a]
HE	-4.484	0.00[a]	-4.576	0.00[a]
EE	-3.109	0.00[a]	-3.697	0.00[a]

p<0.01 a

According to the panel causality test of Smith et al. (2004) presented in Table 2, all three variables included in the model are affected by economic shocks at their level values, but these effects dissipate when the first differences are taken. Economically, global and internal crises cause shocks that have lasting effects on these variables. This indicates that in the Fragile Five economies, public expenditures and output are subject to structural issues that affect LR (hereafter LR) macroeconomic performance beyond short-term (SR) fluctuations. Problems stemming from fiscal policy implementation, high levels of public debt, volatility in commodity prices, and persistent hysteresis effects in the labor market contribute to unit root issues in these economies (Şahbaz et al., 2014). Structural transformations in the education and health sectors have LR impacts on the labor market and, consequently, on output (Koçyiğit et al., 2011). Within the framework of endogenous growth models, education and health expenditures support human capital accumulation and enhance total factor productivity in the LR. As previously mentioned, in the Fragile Five economies—net importers of commodities—fluctuations in oil prices (Erkan et al., 2011), pressures on national currencies, and structural problems in labor markets hinder the contribution of the education and health sectors to output growth (Konat et al., 2022). The LM bootstrap cointegration test developed by Westerlund and Edgerton (2008) addresses issues of autocorrelation and heteroskedasticity even in the presence of CSD in the panel.

$$LM_N^+ = \frac{1}{NT^2} \sum_{i=1}^{N} \sum_{t=1}^{T} \widehat{w}_i^{-2} s_{it}^2$$

w^_i^ (-2) long-run variance refers to the partial sum of the error terms.

Table 3. CSD, Homogeneity and Cointegration

	Statistic	Asymptotic p-value	Bootstrap p-value
CSD:			
CD_{lm} (BP,1980)	178.038	0.00[a]	

CD$_{lm}$ (Pesaran, 2004)	5.813	0.00[a]	
CD (Pesaran, 2004)	4.922	0.00[a]	
LM$_{adj}$ (PUY, 2008)	11.915	0.00[a]	
Homogeneity tests:			
$\tilde{\Delta}$	11.878	0.00[a]	
$\tilde{\Delta}_{adj}$	13.391	0.00[a]	
Panel Cointegration			
Constant	0.985	0.97	0.19
Constant and Trend	3.544	0.97	0.00[a]

Model (1) is estimated. p<0.01 a

According to the results presented in the first part of Table 3, there is evidence of CSD in the regression. Furthermore, the slope parameters obtained for the Fragile Five countries, which indicate the effects of HE and EE on lnGDP, differ across countries. Finally, in the model where lnGDP is the dependent variable and EE and HE are the independent variables, the null hypothesis asserting that EE and HE have a long-run effect on lnGDP is accepted.

$$\Delta lnGDP = \delta_{1i} + \sum_{p=11i}^{k} \delta_{11ip}\Delta lnGDP_{it-p} + \sum_{p=12i}^{k} \delta_{12ip}\Delta HE_{it-p} + \sum_{p=13i}^{k} \delta_{13ip}\Delta EE_{it-p} + \phi_{1i}\hat{\varepsilon}_{it} + v_{1it}$$

In this model, where lnGDP is the dependent variable and EE and HE are the independent variables, two different types of causality can be tested. The hypothesis $\sum_{p=12i}^{k} \delta_{12ip}\Delta HE_{it-p} = 0$ tests the absence of SR causality from HE to lnGDP, while $\sum_{p=12i}^{k} \delta_{12ip}\Delta HE_{it-p} \neq 0$ tests the presence of SR causality from HE to lnGDP. Similarly, the hypothesis $\sum_{p=13i}^{k} \delta_{13ip}\Delta lnEE_{it-p} = 0$ tests the absence of SR causality from EE to lnGDP, whereas $\sum_{p=13i}^{k} \delta_{13ip}\Delta EE_{it-p} \neq 0$ tests the presence of SR causality from EE to lnGDP. If the null hypothesis $\phi_{1i}\hat{\varepsilon}_{it} = 0$ is accepted, it indicates the absence of joint long-run causality from HE and EE to lnGDP. Conversely, if the alternative hypothesis $\phi_{1i}\hat{\varepsilon}_{it} \neq 0$ is accepted, it indicates the presence of joint long-run causality from HE and EE to lnGDP.

Table 4. Panel VAR and Panel VECM Causality

	Short Run			Long Run
	Δ(lnGDP)	Δ(EE)	Δ(HE)	ECT(-1)
Δ(lnGDP)	-	11.069 (0.00)[a]	9.720 (0.02)[b]	-0.31 [-5.626][a]
Δ(EE)	12.785 (0.00)[a]	-	12.201 (0.00)[a]	0.97 [0.976]
Δ(HE)	15.951 (0.00)[a]	2.573 (0.27)	-	0.064 [2.750][a]

a p<0.01, b p<0.05, c p<0.1 () and [] show probability value and t statistics, respectively.

In the SR, there is causality from EE and HE to lnGDP at the 1% significance level. This empirical finding indicates that public education and health expenditures, as components of aggregate demand, support output in the SR. According to Keynesian economic theory, particularly in economies with low per capita income, public spending contributes to output through the multiplier mechanism. It is quite natural for investment expenditures such as education and health, which prioritize individual development, to positively affect output in the SR. Additionally, in the SR, there is causality from lnGDP to EE at the 1% significance level and to HE at the 5% level, as well as from EE to HE at the 1% significance level. This implies that as lnGDP increases, more public resources are allocated to education and health expenditures. This finding is also consistent with Wagner's Law, which suggests that rising income levels lead to an

expansion of public spending (Bayat et al., 2017). Therefore, the increase in social security expenditures alongside output growth in fragile economies, and the emphasis on grounding the development process in social foundations, render this finding significant. The causality from EE to HE indicates that public expenditure policies are interdependent. It is expected that well-educated individuals will generate stronger demand for healthcare services. In the LR, within the model where lnGDP is the dependent variable, there is joint causality from EE and HE to lnGDP at the 1% significance level. In this model, short-term disequilibria are corrected within approximately 3.22 years. According to endogenous growth models, the increase in human capital supports sustainable growth by enhancing total factor productivity (Yenişehirlioğlu et al., 2020). When both the short- and long-run causality results are considered together, it is evident that HE and EE generate a demand-side effect in the SR and contribute to production capacity in the LR. In the long-run model where HE is the dependent variable, there is joint causality from lnGDP and EE to HE at the 1% significance level. In this case, the short-term disequilibria are corrected in approximately 15.6 years, which is considered a considerably long period. This suggests that health expenditures are either independent of or less affected by output cycles and public revenue policies. In summary, education and health expenditures support output in the SR, while output contributes to resource allocation to these sectors in the LR. Over the long term, education and health expenditures contribute to output in a sustainable manner by raising the average knowledge level of the population. The coordination between education and health spending is crucial for the effectiveness of public expenditure policies. Health and education expenditures should be considered together in the formulation of public spending strategies. Based on the error correction coefficients, it should be noted that the effects of health expenditures tend to emerge over a longer period.

Emirmahmutoğlu and Köse (2011), dmaxi represents the optimal lag length between the two variables, determined based on the panel vector autoregression (VAR) method.

$$lnGDP_{it} = \alpha_{1,it} + \sum_{j=1}^{k_i+dmax_i} \beta_{1,ij} lnGDP_{i,t-j} + \sum_{j=1}^{k_i+dmax_i} \gamma_{1,ij} HE_{i,t-j} + \varepsilon_{1,it}$$

The regression is estimated, and the null hypothesis of the Granger-based causality test, $\gamma_{1,i} = \gamma_{2,i} = \cdots = \gamma_{k,i} = 0$ states that there is no causality from HE to lnGDP. The alternative hypothesis, $\gamma_{1,i} = \gamma_{2,i} = \cdots = \gamma_{k,i} \neq 0$ asserts that there is causality from HE to lnGDP.

Table 5. Causality in Countries

Countries	Lag	lnGDP≠>HE	HE≠>lnGDP	Lag	lnGDP≠>EE	EE≠>lnGDP
Brazil	3	3.391 (0.33)	2.430 (0.48)	3	0.919 (0.82)	11.288 (0.01)[b]
India	2	0.431 (0.80)	0.133 (0.93)	1	1.037 (0.30)	0.020 (0.88)
Indonesia	3	2.122 (0.54)	5.003 (0.17)	1	1.622 (0.20)	0.069 (0.79)
South Africa	3	1.005 (0.79)	16.055 (0.00)[a]	1	0.611 (0.43)	4.257 (0.03)[b]
Turkiye	1	0.064 (0.79)	0.006 (0.93)	1	3.470 (0.06)[c]	0.459 (0.49)
Panel Fisher		4.718 (0.90)	18.843 (0.04)[b]		13.153 (0.21)[b]	17.747 (0.059)[c]

a p<0.01, b p<0.05, c p<0.1

According to the country-level causality test results, there is no evidence of causality from lnGDP to HE in any of the countries. This finding generally indicates that in the Fragile Five economies, health expenditures are more influenced by central government budget planning,

political priorities, and the international context than by the level of output. This is because in these economies, the healthcare system is publicly funded, and resources generated from output are not directly allocated to this sector. Moreover, the healthcare systems in these economies are highly dependent on external shocks and political plans. As a result, even if output increases rapidly, this may not immediately lead to a rise in health expenditures. Only in the South African economy is there causality from HE to lnGDP at the 1% significance level. It is thought that high-volume public spending over an extended period in response to issues such as HIV/AIDS has increased labor productivity through employment generated by health expenditures (Odhiambo, 2021). Additionally, in Brazil and South Africa, there is causality from EE to lnGDP at the 5% significance level. During the Lula da Silva administration, social transfers under the program "Bolsa Família" were directed toward education (Montenegro & Shenai, 2019). In this way, the accumulation of human capital contributed to output by enhancing total factor productivity. A similar situation occurred in post-Apartheid South Africa, where education spending reduced socio-economic exclusion and increased household participation in economic activities (Eggoh et. al., 2015). In the case of Turkey, causality from lnGDP to EE exists at the 10% significance level. Public spending increases resulting from output growth are reflected in education expenditures. However, the relationship between lnGDP and EE in the Turkish economy does not fully operate within an institutional framework. The centralized structure of education policy in Turkey has led education spending decisions to be closely tied to political cycles. The absence of causality between lnGDP and EE or HE in India and Indonesia can be attributed to the spatial nature of public spending in these economies and the inefficiencies introduced by bureaucracy. Furthermore, since the production structure in these economies is largely dependent on industry and the private sector, the impact of social transfer expenditures on output is indirect and delayed. The weak institutional structures in these countries prevent public spending from generating the expected effect on output. In economies like South Africa, where severe public health challenges exist and systemic health reforms are necessary, the effect of health expenditures on output is relatively more difficult to realize. For education expenditures to generate the expected effect on output, strong institutional foundations are required. In India and Indonesia, where the population is large, the weak institutional structure and the inefficiency of the centralized system imply that output growth does not stem from the development of human capital (Mallick et. al., 2016). Ultimately, although output in the Turkish economy does affect the education system, this influence is not at the expected level and is largely shaped by the political preferences of the government.

CONCLUSION AND POLICY IMPLICATIONS

With the failure of the neoclassical convergence hypothesis to adequately explain output growth, endogenous growth models have increasingly turned to alternative concepts. Among these alternatives, the aim is to enhance total factor productivity through increased investment in education and health expenditures. For this reason, investment in these two sectors is of critical importance for the sustainability of output growth in both the SR and LR. The efficiency of such expenditures not only raises the average level of societal welfare but also enhances labor productivity. Accordingly, the primary motivation of this study is to examine the effects of education (EE) and health (HE) expenditures on output (lnGDP) in Brazil, India, Indonesia, South Africa, and Turkey—emerging economies collectively known as the Fragile Five—over the period 2004–2021. These countries were selected because they share similar macroeconomic vulnerabilities, such as large current account deficits, dependence on foreign savings to finance investment, exposure to nominal exchange rate volatility, low marginal propensities to save, and frequent, irregular political instability. Furthermore, these economies face structural issues in financing quasi-public goods, making it essential to understand how such expenditures influence output from a policymaking perspective. Ultimately, this study investigates the impact of human capital on output in five countries that, while geographically distinct, share similar socio-political characteristics. The empirical analysis begins with testing for CSD, which reveals that all three

variables are subject to similar external or global shocks across these economies. Macroeconomic problems emerging in global markets tend to elicit similar policy responses in these countries. Using the Smith et al. (2004), the findings indicate that all three variables are exposed to economic shocks. This suggests that HE and EE exert not just temporary but also structural and LR effects on lnGDP. In the panel causality tests, bidirectional causality is observed in the SR: from EE and HE to lnGDP, and from lnGDP to both EE and HE. These findings support both the demand-side approaches of Keynesian economics and Wagner's Law. In this context, while expenditures on quasi-public goods contribute to output, increases in output also reinforce spending on such goods. The observed causality from EE to HE further suggests that the provision of education and health services is complementary in nature. In the LR, joint causality from EE and HE to lnGDP is confirmed, and short-term imbalances are corrected within approximately 3.2 years. This underscores the necessity for continuity in public education and health policies to ensure their effectiveness over time. Additionally, LR causality from EE and lnGDP to HE is detected, with the adjustment mechanism taking approximately 15.6 years. This indicates that the responsiveness of health expenditures to output growth is relatively slow and unfolds gradually. At the country level, distinct dynamic relationships are observed. In Brazil, the presence of causality from EE to lnGDP reflects the impact of public spending focused on social transfers. In South Africa, causality from both EE and HE to lnGDP suggests that public spending aimed at addressing historical inequalities and health crises has contributed to transforming human capital into productive capacity. In contrast, in Turkey, the causality from lnGDP to EE implies that economic prosperity does not directly translate into education investment. The absence of causality in India and Indonesia may indicate low efficiency in expenditures on quasi-public goods. Although the study aims to be as detailed as possible, several limitations exist. First, the empirical analysis considers only the impact of EE and HE on lnGDP, excluding variables such as private sector fixed capital investment, institutional quality indicators, technological advancement, and political preferences. Second, the classification of EE and HE into public and private components has not been performed. Third, spatial effects and the qualitative aspects of both sectors have not been incorporated into the model. In terms of policy implications, governments should align their expenditure composition with human capital accumulation objectives. Investments in both sectors should aim to enhance quality. In Brazil, the continuation of social assistance programs is crucial; in India and Indonesia, stricter oversight of public expenditures is needed; and in Turkey, institutional strengthening and avoidance of frequent policy shifts are recommended. These economies should also increase cooperation with international education and health organizations, design data-driven policies, and implement performance-based budgeting practices. Lastly, educational policy must be closely linked to the labor market, while health policy should be aligned with productivity, requiring coordinated and mutually reinforcing public strategies.

EXTENDED ABSTRACT

This study comprehensively examines the impact of education and health expenditures on economic growth in the economies of Turkey, Brazil, India, Indonesia and South Africa, referred to as the "Fragile Five" between 2004 and 2021. Since the convergence hypothesis of neoclassical economics is insufficient to explain the growth dynamics in developing economies, the research is based on human capital-focused endogenous growth models. In this context, the study analyzes how structural vulnerabilities, especially high current account deficit, external financing dependency, inflationary pressures and institutional weaknesses, affect the efficiency of public expenditures. Using panel data obtained from the World Bank, short- and long-term causality relationships are detailed with advanced econometric methods such as cross-section dependency (CSD), unit root tests (Smith et al., 2004), Westerlund and Edgerton (2008) LM bootstrap cointegration test and panel vector error correction models (VECM). The analyses revealed the existence of cross-sectional dependence in all variables (GDP, education and health expenditures) and that the variables contained unit roots in their level values. The Westerlund

and Edgerton (2008) test confirmed that there was a long-term equilibrium relationship between the variables. Short-term dynamics, consistent with Keynesian demand-side effects and Wagner's Law, showed bidirectional causality between education and health expenditures and GDP: While public expenditures support economic activity, the increase in growth triggers the allocation of resources to these sectors. For example, while investments in education infrastructure create employment and stimulate consumption, they increase GDP in the short term, while health expenditures increase labor productivity, which leads to a similar effect. In addition, the unidirectional causality from education expenditures to health expenditures reflects the complementarity of these two areas; since the educated population has a higher demand for access to health services. In the long term, error correction mechanisms have highlighted the sustainable impact of education and health expenditures on GDP: While imbalances in GDP are balanced in a relatively short time of 3.2 years, the impact of health expenditures requires a 15.6-year adjustment period, indicating that the transformation of these investments into productivity encounters structural obstacles (institutional slowness, bureaucratic inefficiency). The heterogeneous results across countries have highlighted the critical role of contextual factors in policy design. Social transfer programs such as Bolsa Família in Brazil have reduced poverty and alleviated regional inequalities by strengthening human capital through education expenditures. For example, this program, implemented between 2003 and 2014, provided cash support to families in return for sending their children to school and significantly increased school enrollment rates. In South Africa, public investments in the fight against HIV/AIDS have improved health infrastructure, increased labor productivity, and, especially since the early 2000s, reduced the rate of spread of the disease. The unidirectional causality from GDP to education expenditures in Turkey indicates that centralized and political cycle-dependent spending policies are combined with institutional weaknesses. For example, the fact that a large portion of the education budget is allocated to personnel expenses restricts infrastructure and technology investments and prevents quality improvements. In contrast, the absence of a significant relationship between public expenditures and growth in India and Indonesia is explained by bureaucratic inefficiencies, low quality of semi-public goods, and a private sector-dominated growth model. In India, the inadequacy of technical and vocational education infrastructure causes the workforce to fail to adapt to industrial needs, while in Indonesia, regional inequalities in access to health services deepen productivity losses.

In terms of policy recommendations, the study emphasizes the need for customized strategies for each country. It is recommended that Brazil strengthen its anti-corruption mechanisms while continuing social programs, South Africa expand its health infrastructure to rural areas, and prioritize preventive policies in the fight against HIV/AIDS. In Turkey, it is critical to purify education policies from political influences, implement quality-oriented reforms through autonomous institutions, and ensure harmony between vocational training and industrial needs. In India and Indonesia, the capacity of local governments should be strengthened, transparent budgeting systems should be established, and private sector-human capital collaborations should be encouraged to increase the efficiency of public expenditures. Performance-based budgeting, cooperation with international organizations in education and health projects, development of qualified data collection systems, and integration of sectoral policies with long-term development plans are recommended for all economies. The limitations of the study include the fact that private sector investments, technological innovations, and institutional quality indicators are not included in the model. In addition, analyzing education and health expenditures without making a public-private distinction has prevented a full understanding of the efficiency in these sectors. It is recommended that future studies use qualitative data (quality of education curriculum, accessibility of health services), examine regional differences with spatial econometric methods, and test the asymmetric effects of expenditures on growth through threshold models.

As a result, education and health expenditures in Fragile Five economies, although they create demand-side effects in the short term, should be supported by institutional reforms, transparent governance mechanisms, and coordination of sectoral policies for long-term sustainable growth. These findings reveal that human capital should not be considered as a mere cost item, but as the fundamental dynamic of inclusive development.

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