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HEALTH-LED ECONOMIC GROWTH IN SHORT AND LONG RUN: CASE OF EUROPEAN COUNTRIES

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ABSTRACT. In recent decades, while public expenditure on healthcare has increased considerably, life expectancy growth has slowed down. Therefore, research on the relationship between healthcare financing and economic growth has become highly relevant in determining the efficiency of financial resource allocation. This study aims to explore three hypotheses on the subject. The first hypothesis is that increase in healthcare spending has a positive impact on economic growth in long run, the second – assess the same relationships in short run, and the third – assumes that scale and direction of the relationships in the chain "health expenditures → GDP per capita growth" varies due to country income. Hypotheses testing involves application of cluster analysis, Calinski–Harabasz pseudo-F stopping rule, pooled mean group estimator, and Hausman test based on data for 34 European countries for the period 2000-2023. The obtained results only partially confirmed the hypotheses.

JEL Classification: C23, F63, H51, I15, O47, O52

Keywords: economic growth, health, expenditure, healthcare financing, European countries

Introduction

The World Health Organization (2023a) reported that the healthcare expenditure to GDP ratio over the past few decades has demonstrated an upward change. There are some differences in spending on healthcare depending on country wealth. On average, high-income countries spent up to 9% of GDP on healthcare as of the end of 2021. Meanwhile, healthcare expenditures allocated by upper-middle income countries and low-income countries are almost equal and reached 7% of GDP as of the end of 2021, despite a historical gap by nearly 1% between healthcare spending in upper-middle income countries and low-income countries in the early 2000s. This trend suggests convergence in the development of healthcare systems in upper-middle income and low-income countries. Finally, lower-middle income countries demonstrate the lowest ratio of healthcare expenditure to GDP (5.5%). Notably, the growth rates of total public spending on healthcare as a percentage of GDP vary across the same countries: this indicator is the lowest for low-income countries and the highest for high-income countries.

At the same time, the life expectancy of the population increased by almost 6 years, from 66.8 in 2000 to 73.1 in 2019 (World Health Organization, 2023b). Indeed, positive changes in public health indicators have accompanied healthcare spending growth. However, the rate of this growth has been slowing down year-to-year. The COVID-19 pandemic significantly worsened the overall health outcomes. According to Macrotrends (2025), while global life expectancy increased by 0.39% in 2019, this indicator rose only 0.24% in 2020. Moreover, it is also forecasted that the life expectancy growth rate will demonstrate downward movement to zero growth during the next decade. Therefore, controversial evidence exists about the scale and direction of the relationships between healthcare expenditure and health outcomes. Poor impact of healthcare spending on health outcomes, also associated with negligible improvement of the labour force. Therefore, the effectiveness of financial resource allocation, particularly government expenditure, is questioned in terms of ensuring economic growth. Given the above, this study aims to identify trends in the short- and long-run relationship between healthcare expenditure and economic growth for the sample of 34 European countries.

1. Literature review

In the scientific literature, considerable attention has been devoted to the study of the relationship between health financing and economic growth. However, researchers sometimes obtain contradictory results, which requires a more detailed study of these aspects. In addition, analysis of transformational patterns due to the impact of the pandemic on the relationship between these parameters become more urgent nowadays (Gheorghe & Panazan, 2024).

Thus, the first group of works focuses on determining the general prerequisites for ensuring economic growth (Tkacova et al., (2023); Sarker et al, (2023); Khang et al. (2024); Mahfoudh et al., (2024); Dinu. et al. (2024); Suhanyi et al., (2024); Chao, Di (2024); Nikšić et al., (2024); Cyrek (2024); Stankevičienė & Borisova (2022); Svazas et al. (2023); Ghauri et al. (2024); Dinu (2024)). Along with traditional determinants of economic growth such as inflation, employment, investment, trade openness, good governance, development of digital technologies, researchers note the importance of public spending in ensuring economic growth. Thus, Vysochyna et al. (2023) examine how healthcare spending influences sustainable

economic growth before and during the COVID-19 pandemic. However, during the pandemic (2020–2021), healthcare expenditures did not demonstrate a statistically significant influence on sustainable economic growth. Yoon (2023) also examined the patterns of post-pandemic economic recovery in South Korea and found that additional government funding accelerated the pace of economic recovery. Piekut & Rybaltowicz (2024) also emphasize the importance of social spending in ensuring economic growth (based on the experience of the Visegrád countries and Benelux). Hamadouche (2024) identified relationships between public expenditure and inflation: 1% increase in spending trigger inflation by 0.23% in long run and 2% in short run. Author also revealed that inflation positively correlates with the broad money supply and imports-to-GDP ratio but inversely relates to GDP per capita, indicating economic growth may alleviate inflationary pressures. Linh (2024) also found that economic growth in Asian countries depends on foreign direct investment, employment levels, government spending, inflation and trade openness.

Another research perspective is focused on studying the channels through which population health affects economic growth. A significant part of these research devoted to the analysis of the relationships in the chain "population health – human capital – economic growth" (Knapińska & Woźniak-Jasińska, 2024; Padgureckienė & Cibulskienė, 2024; Privara, 2022; Bouvier, Hwang, Hwang (2024); Mec & Cermakova (2024); Grencikova et al. (2022)). Yehorova and Drozd (2024) operate on the premise that reducing work absences caused by health issues, unemployment, and mortality contributes to enhancing six core macroeconomic freedoms: business, labour, trade, investment, monetary, and financial. In this context, health-related absences, unemployment, and mortality hinder human capital development. Their presence limits an individual's ability to acquire the essential knowledge and skills needed to convert their labour into economic value. Oe et al. (2023) identify key factors such as social interaction spaces and robust health policy to support and improve mobility and accessibility for elderly residents in Mihama City, Fukui Prefecture, Japan. Takawira and Mutambara (2023) examine how managing business complexity, developing human resources, and setting strategic direction contribute to maintaining a sustainable competitive edge in South Africa's pharmaceutical distribution sector.

Akinyemi (2024) examines the impact of pandemic-induced job loss and workplace closures on public attitudes toward government policies and the prevalence of conspiracy beliefs in Europe. Findings indicate that individuals who lost their jobs due to COVID-19 are about 20% more likely to exhibit dissatisfaction with governmental COVID-19 responses and to endorse conspiracy theories. Takemoto et al. (2024) examine regional vulnerabilities to frequent and severe disasters, focusing on Japan. The authors reveal that building trust in municipal disaster preparedness requires enhanced citizen services and clear, decisive leadership. Findings by Awojobi et al. (2023) indicate that lockdown measures increased poverty, income loss, heightened food insecurity, and rising unemployment. The impact was significantly more severe for women and rural inhabitants. In response, governments introduced or expanded social protection programs, including cash and food transfers, utility subsidies, tax reliefs, and unemployment benefits.

A third group of researchers examined the causes of the volatility of health care expenditures and their contribution to ensuring positive economic dynamics (Ivanková et al. (2020); Baskiewicz et al. (2023); Rudawska, Krot, Porada-Rochoń (2024)). Thus, Ray (2024) reveals that the Supplemental Nutrition Assistance Program expenditures have increased over 62-fold, from approximately $1.82 billion in 1969 to over $113 billion in 2022. The analysis indicates the presence of a unit root in the time series, suggesting that the growth in program costs may be unstable. Huzenko (2024) suggests that intensive fertiliser use contributes to environmental pollution, such as nitrate contamination and greenhouse gas emissions, leading

to pollution-related health issues and, consequently, elevated healthcare costs. Additionally, a higher share of food imports is associated with increased health expenditures, possibly due to health risks linked to imported food quality. The impact of export share on health spending presents mixed results, indicating a complex balance between economic benefits and environmental health costs. Pozovna et al. (2023) revealed that a unit increase in healthcare indices correlates with a 0.014 decrease in socio-economic development, potentially due to elevated mortality rates. The authors emphasize the necessity for effective epidemic and pandemic response plans, including scalable healthcare systems and coordinated inter-agency efforts.

Sheliemina (2023) examines the effectiveness of recent healthcare reforms in Ukraine, focusing on optimizing expenditure within the medical sector. The study analyzes medical service providers' primary income and expense components, emphasizing the importance of efficient management to enhance overall healthcare performance. A key aspect discussed is the remuneration of healthcare workers; prior to the reforms, physicians' salaries were minimal, leading to widespread informal payments from patients. The research suggests that linking compensation directly to performance metrics can serve as a motivator, improving the quality and efficiency of medical services. By prioritizing effective labour cost management, the reforms aim to elevate social protection levels and, consequently, the quality of life for the Ukrainian population.

Kuzior et al. (2022a) examine the interconnections among health insurance coverage, household income levels, and public health funding in Ukraine. Findings suggest that lower-income households face significant barriers to obtaining adequate health insurance, leading to disparities in healthcare access. Kuzior et al. (2022b) posit that access to affordable housing is a critical determinant of public health, influencing individual well-being and broader societal health metrics. Through a comprehensive analysis, the authors examine how variations in affordable housing provision impact healthcare systems and the overall health of populations. The findings suggest that enhancing affordable housing availability can improve public health outcomes, reduce healthcare costs, and contribute to inclusive economic growth. In more recent research, Kuzior et al. (2023) suggest that countries with well-organized, adequately funded public health systems demonstrated greater resilience against the pandemic's challenges. In contrast, Ukraine's healthcare system faced significant difficulties due to underfunding and structural inefficiencies.

3. Methodology

In scientific literature, there is evidence that health and economic growth are interdependent. Improving economic conditions and wealth help to strengthen healthcare schemes, medical system capacity, lower the risk of spreading social diseases, etc. It brings us to the conclusion that better economic conditions are associated with better healthcare and allow higher healthcare spending. Otherwise, higher healthcare expenditures and better public health efficiency might also increase the number of older people who are economically inactive. Therefore, there might be direct and indirect causality between healthcare expenditures and economic growth. While most academicians agree that economic growth does affect healthcare expenditures, there is also an assumption that healthcare expenditures might influence economic growth. Basically, economists argue that there is only a one-way relationship: economic growth → healthcare expenditures (Mehra and Musai, 2011; Alhowish, 2014; Chang, Chang and Wang, 2022;), health economists argue that there might be opposite way causality: healthcare expenditures → economic growth (Alam, Singh and Singh, 2022) or even two-way

relationships (Nasreen, 2021; Ozyilmaz et al., 2022). As there are controversial scientific results on this issue, the purpose of this study is to test several hypotheses:

Hypothesis 1: Increased healthcare spending positively impacts economic growth in the short run. The hypothesis originated from the assumption that higher health expenditures are associated with better health care options and higher contribution to population health; as a result – lower risk of disease, higher quality of medical insurance and better labour productivity.

Hypothesis 2: Increased healthcare spending positively impacts economic growth in the long run. The hypothesis assumes that higher investments in healthcare in the long run lead to improvement of medical infrastructure and healthcare services, while better healthcare capacity contributes to an increase in life expectancy and reduction of health risks. All these trends are also associated with qualitative and quantitative improvement of workforce and labour productivity and therefore act as a driver of economic growth.

Hypothesis 3: There is a difference in peculiarities of cause-and-effect relationships between health expenditure and economic growth within countries with different GDP per capita levels. Basically, we assume that wealthier countries have a lower scale of health expenditure impact due to boosting economic growth.

In scientific literature, the most commonly used measurement indicators of economic growth are GDP, GDP per capita, GDP growth, and GDP per capita growth. As far as we will use different kinds of health expenditure per capita while choosing between GDP and GDP per capita, we argue in favour of the latter. The use of GDP per capita together with health expenditure per capita to test relationships between them is mentioned in Atligan et al. (2024), Piabuo and Tieguhong (2017). Therefore, GDP per capita growth (annual %) (*GDPpcg*).

It is chosen several proxies of healthcare expenditure such as:

- Domestic general government health expenditure per capita (current US$) (*DGGHEpc)*;
- Domestic private health expenditure per capita (current US$) (*DPHEpc*);
- External health expenditure per capita (current US$) (*EHEpc*).

Basically, as the dependent variable is one of the measures of economic growth, it is considered a set of control variables traditionally used in economic growth models:

- Gross capital formation (% of GDP) (*GCFgdp*);
- Trade (% of GDP) (*Trade*);
- Inflation, consumer prices (annual %) (*CPI*);
- Urban population growth (annual %) (*Urban_pop*);
- Employment to population ratio, 15+, total (%) (modeled ILO estimate) (*Empl*).

To test the hypotheses, a data set was collected from the World Development Indicators collection of the World Bank Group (Word Bank DataBank, 2025). Country sample consists of 34 European countries – Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Moldova, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom. Observation period – 2000-2023. Missing observations were predicted based on extrapolation.

To underline short run and long run coefficients of healthcare expenditures per capita impact on GDP per capita growth, it is used a pooled mean group estimator, developed by Pesaran, Shin and Smith (1999). It is used "xtpmg" add-on in the Stata 14.2/SE software product (Stata, 2025).

Testing of hypothesis 3 also consider conducting cluster analysis to split the country sample into groups due to similarity of country wealth (2000-2023 averaged value of GDP per

capita, current USD is a basics for country clustering). Calinski–Harabasz pseudo-F stopping-rule is used to clarify the number of clusters for k-median hierarchical cluster analysis.

4. Empirical results and discussion

Summative statistics on the research variables for the 34 studied countries for 2000-2023 are presented in Table 1.

Table 1. Summative statistics

Variables	Obs	Mean	Std. Dev.	Min	Max	Skew.	Kurt.
GDPpc	816	28087.835	22787.207	440.539	108798.45	0.988	3.58
GDPpcg	816	2.4096	4.0656	-22.75	23.44	-0.594	7.221
GCFgdp	816	23.6495	4.835	8.93	53.71	0.805	5.797
Trade	816	101.7822	37.7277	21.11	250.11	0.868	3.449
CPI	816	3.8159	6.1452	-4.45	95.01	7.265	86.218
Urban_pop	816	0.038	0.9261	0.42	2.93	1.431	13.822
Empl	816	53.3793	7.9029	33.39	76.26	0.134	3.073
DGGHEpc	816	1855.5906	1733.7243	10	8509.9805	0.978	3.57
DPHEpc	816	706.4028	932.1782	10	7490.7681	4.231	25.156
EHEpc	816	1.3652	3.2901	-0.12	26	4.303	25.389

Source: Authors' calculations in Stata 14.2/SE software (Stata, 2025) based on World Bank Data (World Bank DataBank, 2025)

As far as it can be seen from the Table 1, the panel is strongly balanced without omitted observations. Based on the value of Skewness coefficient, it can be concluded that considerable asymmetry of the distribution is a characteristic for such variables as consumer price index (*CPI*), Urban population growth (*Urban_pop*), Domestic private health expenditure per capita (current US$) (*DPHEpc*), External health expenditure per capita (current US$) (*EHEpc*). Logarithmic transformation is used for all variables except *Urban_pop* (applied square root) to eliminate skewness.

There is also a considerable difference between the maximum and minimum value of the GDP per capita, so it is advisable to run clustering to avoid non-stationarity.

Applying Calinski–Harabasz pseudo-F stopping-rule in the Stata 14.2/SE software (Stata, 2025) allows identifying the optimal number of clusters for the country sample is two. Cluster analysis is based on the 2000-2023 averaged value of GDP per capita.

Cluster statistics and cluster members are presented in Table 2.

As of the data presented in Table 2, it can be noted that cluster 1 consists of 20 European countries which have lower GDP per capita values. Within cluster 1, GDP per capita varies from 2734.16 USD to 27793.29 USD with an averaged cluster level – 12552.40 USD. Cluster 2 consists of 14 developed European countries with relatively high GDP per capita. Within cluster 2, GDP per capita varies from 33025.93 USD to 77698.14 USD with an averaged cluster level – 50386.92 USD. To check whether the clustering is fair enough (i.e. the difference in the GDP per capita is significant enough to subdivide units in different clusters based on GDP per capita difference), the Mann-Whitney U test (also known as the Wilcoxon rank-sum test) is used. To apply the test, we used the command “ranksum” by cluster ID variable and got p-value=0.000. Test results led to the conclusion that GDP per capita distributions are significantly different between the clusters.

Table 2. Cluster statistics and cluster members

ID	Country	GDPpc	Cluster
1	Albania	4091.24	1
4	Bosnia and Herzegovina	4553.67	1
5	Bulgaria	7176.08	1
6	Croatia	13072.46	1
7	Czechia	18797.80	1
9	Estonia	16991.21	1
13	Greece	21106.85	1
14	Hungary	13260.96	1
18	Latvia	13713.77	1
19	Lithuania	13938.39	1
20	Moldova	2734.16	1
22	North Macedonia	4964.24	1
24	Poland	12279.48	1
25	Portugal	20677.72	1
26	Romania	8856.40	1
27	Serbia	6353.04	1
28	Slovak Republic	15860.24	1
29	Slovenia	21994.34	1
30	Spain	27793.29	1
33	Ukraine	2832.71	1
	Cluster average	12552.40	1
2	Austria	44332.21	2
3	Belgium	41921.50	2
8	Denmark	54998.26	2
10	Finland	44051.98	2
11	France	37748.45	2
12	Germany	41808.88	2
15	Iceland	54863.60	2
16	Ireland	61882.41	2
17	Italy	33025.93	2
21	Netherlands	48309.01	2
23	Norway	77698.14	2
31	Sweden	49621.75	2
32	Switzerland	73730.25	2
34	UK	41424.51	2
	Cluster average	50386.92	2

Source: Authors' calculations in Stata 14.2/SE software (Stata, 2025) based on World Bank Data (World Bank DataBank, 2025)

At the next stage of the research, to test the hypothesis about positive short and long run healthcare spending impact on economic growth, it is realised cause-and-effect research based on pooled mean group estimator, developed by Pesaran, Shin and Smith (1999). Application of the Hausman test allows clarifying that among the three techniques – pooled mean group (pmg), mean group (mg) and dynamic fixed effect (dfe), the last option is more relevant. It uses standard errors adjusted with the cluster(id) option to control serial correlation. As for testing hypothesis 3 about the difference in these cause-and-effect relationships within countries with different GDP per capita levels, the research is conducted for the whole panel of countries and each cluster of countries separately. Within the first iteration of the modelling, we include all independent and control variables in the models. However, we gradually eliminate statistically insignificant coefficients from the above models to improve their quality at further stages.

Results for the whole country sample (independent variable – domestic general government health expenditure per capita) are presented in Table 3. In contrast, cluster-specific results are presented in Tables 4 and 5, respectively.

Table 3. Pooled mean group estimator results on short and long run impact of domestic general government health expenditure per capita on GDP per capita growth rate in 34 European countries in 2000-2023 (Dynamic Fixed Effects Regression: Estimated Error Correction Form)

Variable	Coefficient	Std. Err.	Z	P>|z|
		Long run		
DGGHEpc	-0.0055	0.0001	-5.36	0.000
GCFgdp	0.1879	0.0442	4.26	0.000
Empl	-0.1559	0.0656	-2.37	0.018
		Short run		
DGGHEpc	0.0014	0.0005	2.80	0.005
Trade	0.0857	0.0271	3.17	0.002
L_CPI	0.5056	0.2425	2.08	0.037
Empl	1.3444	0.2269	5.93	0.000
Constant	7.3325	3.7791	1.94	0.052

Source: Authors' calculations in Stata 14.2/SE software (Stata, 2025) based on World Bank Data (World Bank DataBank, 2025)

Table 4. Pooled mean group estimator results on short and long run impact of domestic general government health expenditure per capita on GDP per capita growth rate in 20 European countries (cluster 1) in 2000-2023 (Dynamic Fixed Effects Regression: Estimated Error Correction Form)

Variable	Coefficient	Std. Err.	Z	P>|z|
		Long run		
DGGHEpc	-0.0018	0.0007	-2.63	0.009
GCFgdp	0.1505	0.0538	2.80	0.005
		Short run		
DGGHEpc	0.0036	0.0018	1.96	0.050
GCFgdp	0.6758	0.0578	11.69	0.000
Empl	0.7017	0.1708	4.11	0.000

Source: Authors' calculations in Stata 14.2/SE software (Stata, 2025) based on World Bank Data (World Bank DataBank, 2025)

Based on the research results from Tables 3-5, it can be concluded that there is a statistically significant negative long-run influence of domestic general government health expenditure per capita increase on GDP per capita growth for the whole country sample and each country cluster separately. These results brought to the rejection of hypothesis 2 about the positive impact of healthcare spending on long-term economic growth. It also should be noted that the causal relationships between dependent and core independent variables are more reliable for cluster 2, while they are 4 times weaker for cluster 1.

Hypothesis 1 confirmed. It is revealed that an increase in domestic general government health expenditure per capita positively affects GDP per capita growth in the short run for all three models. Differentiation of the estimation results allows confirming hypothesis 3.

Table 5. Pooled mean group estimator results on short and long run impact of domestic general government health expenditure per capita on GDP per capita growth rate in 14 European countries (cluster 2) in 2000-2023 (Dynamic Fixed Effects Regression: Estimated Error Correction Form)

Variable	Coefficient	Std. Err.	Z	P>|z|
		Long run		
DGGHEpc	-0.0004	0.0001	-3.90	0.000
GCFgdp	0.1551	0.0299	5.19	0.000
L_CPI	-0.5802	0.3074	-1.89	0.059
Empl	-0.1417	0.7049	-1.72	0.085
		Short run		
DGGHEpc	0.0007	0.0004	1.72	0.085
GCFgdp	-0.2745	0.0874	-3.14	0.002
Trade	0.0911	0.0275	3.31	0.001
L_CPI	0.9746	0.4311	2.26	0.024
S_Urban_pop	2.4846	0.7449	3.34	0.001
Empl	1.9337	0.2553	7.57	0.000

Source: Authors' calculations in Stata 14.2/SE software (Stata, 2025) based on World Bank Data (World Bank DataBank, 2025)

Table 6. Pooled mean group estimator results on short and long run impact of domestic private health expenditure per capita on GDP per capita growth rate in 34 European countries in 2000-2023 (Dynamic Fixed Effects Regression: Estimated Error Correction Form)

Variable	Coefficient	Std. Err.	Z	P>|z|
		Long run		
L_DPHEpc	-1.8066	0.3764	-4.80	0.000
GCFgdp	0.1430	0.0484	2.95	0.003
Trade	0.0213	0.0119	1.79	0.073
L_CPI	-0.5563	0.1442	-3.86	0.000
		Short run		
L_DPHEpc	9.1140	1.8322	4.97	0.000
Trade	0.0669	0.0235	2.85	0.004
L_CPI	0.8158	0.2235	3.65	0.000
Empl	1.2117	0.1702	7.12	0.000
Constant	8.1199	2.4478	3.32	0.001

Source: Authors' calculations in Stata 14.2/SE software (Stata, 2025) based on World Bank Data (World Bank DataBank, 2025)

Table 7. Pooled mean group estimator results on short and long run impact of domestic private health expenditure per capita on GDP per capita growth rate in 20 European countries (cluster 1) in 2000-2023 (Dynamic Fixed Effects Regression: Estimated Error Correction Form)

Variable	Coefficient	Std. Err.	Z	P>|z|
		Long run		
L_DPHEpc	-1.1821	0.2976	-3.97	0.000
GCFgdp	0.0789	0.0419	1.88	0.060
		Short run		
L_DPHEpc	8.0673	1.77218	4.69	0.000
GCFgdp	0.5379	0.0560	9.60	0.000
L_CPI	0.3873	0.2289	1.69	0.091
Empl	0.8591	0.1516	5.67	0.000
Constant	7.1377	2.2019	3.24	0.001

Source: Authors' calculations in Stata 14.2/SE software (Stata, 2025) based on World Bank Data (World Bank DataBank, 2025)

Table 8. Pooled mean group estimator results on short and long run impact of domestic private health expenditure per capita on GDP per capita growth rate in 14 European countries (cluster 2) in 2000-2023 (Dynamic Fixed Effects Regression: Estimated Error Correction Form)

Variable	Coefficient	Std. Err.	Z	P>|z|
		Long run		
L_DPHEpc	-0.9379	0.4143	-2.26	0.024
GCFgdp	0.1166	0.0457	2.55	0.011
L_CPI	-0.8507	0.3557	-2.39	0.017
		Short run		
L_DPHEpc	4.9319	2.1604	2.28	0.022
GCFgdp	-0.2614	0.0796	-3.28	0.001
Trade	0.1005	0.0222	4.52	0.000
L_CPI	1.0617	0.4538	2.34	0.019
S_Urban_pop	2.1658	0.7088	3.06	0.002
Empl	1.8345	0.2374	7.73	0.000

Source: Authors' calculations in Stata 14.2/SE software (Stata, 2025) based on World Bank Data (World Bank DataBank, 2025)

Results from Tables 6-8 showed that hypothesis 2 might be rejected as there is a significant negative long-run impact of domestic private health expenditure per capita on GDP per capita growth for the whole country sample and each country cluster.

Nonetheless, it particularly confirms the hypothesis 1 both for the whole country sample and for each cluster specifically. Additionally, as the results of this research block differ significantly for cluster 1 and cluster 2, we can also confirm hypothesis 3.

While analysing causality between external health care expenditure per capita and GDP per capita growth rate, it is found that there are statistically significant relationships only in the long run for countries of cluster 2 (Table 9).

Table 9. Pooled mean group estimator results on the long run impact of external private health expenditure per capita on GDP per capita growth rate in 14 European countries (cluster 2) in 2000-2023 (Dynamic Fixed Effects Regression: Estimated Error Correction Form)

Variable	Coefficient	Std. Err.	Z	P>|z|
	Long run			
L_DPHEpc	-0.2206	0.961	-2.30	0.022
Trade	-0.0417	0.0077	5.36	0.000

Source: Authors' calculations in Stata 14.2/SE software (Stata, 2025) based on World Bank Data (World Bank DataBank, 2025)

The rest of the modelling results are insignificant. Therefore, we can rejected both hypothesis 1 and 2 in terms of causal relationships between external health expenditure per capita and GDP per capita growth as far as there is not statistically significant short run and long run coefficients for the whole country panel and cluster 1 countries, while long run relationships for cluster 2 countries are inverse and short run relationships for this group of countries are also insignificant.

5. Conclusion

Existing scientific literature argues that there is a positive nexus between healthcare financing and economic growth. Nevertheless, researchers have no common opinion on the scale of these relationships. Moreover, there is also some empirical evidence that economic growth and healthcare financing are negatively correlated. It also should be noted that the coronavirus pandemic brought scientific attention to previously revealed relationships, especially in healthcare.

Due to testing hypothesis 1 about the positive short-run impact of healthcare spending on economic growth, it can be concluded that the hypothesis is partially confirmed. Basically, 1 USD increase of domestic general government health expenditure per capita results in 0.0014% increase of GDP per capita growth rate for the whole country sample, in 0.0036% increase of GDP per capita growth rate for countries of cluster 1, and 0.0007% growth of GDP per capita growth rate for countries of cluster 2. It is also found that 1% increase in domestic private health expenditure per capita led to GDP per capita growth rate increase by 9.11% for all 34 countries, by 8.07% – for countries of cluster 1, and 4.93% – for countries of cluster 2. There is also an insignificant both short run and long run impact of external health expenditure per capita in all three models.

Due to testing the hypothesis 2 about positive long run impact of healthcare spending on economic growth, it is revealed that this hypothesis is rejected as research results showed inverted statistically significant relationships between domestic general government health expenditure per capita and GDP per capita growth rate as for the whole panel and each cluster of countries specifically. The same tendency is fair for causal relationships between domestic private health expenditure per capita and GDP per capita growth. In turn, external health expenditures do not demonstrate statistically significant long run influence on GDP per capita growth, except long run dependence for cluster 2 countries, which demonstrate inverse relationships between variables: 1 % increase of external private health expenditure per capita led to GDP per capita growth rate shortage by 0.22% for countries of cluster 2.

These findings also confirm hypothesis 3 about the different scale and direction of relationships between these variables.

Research results correlate with the results of Atilgan et al. (2024), who also empirically confirmed (based on panel data of OECD countries) that health spending positively impacts

GDP per capita. They argued that in modern conditions, we need to consider health spending "as an engine of economic growth rather than just a byproduct of growing income levels". Ozyilmaz et al. (2022) also tested the hypothesis about the bidirectional causality relationship between health expenditures and economic growth (GDP per capita is chosen as the measurement indicator of economic growth) for 27 European countries. The authors also empirically confirmed that health spending growth positively affects GDP per capita and vice versa. They also argued that government health expenditures have the highest growth importance, while private and out-of-pocket expenditures are less critical. Piabuo and Tieguhong (2017) also research health expenditures and economic growth based on per capita indicators (for central African states (CEMAC) and selected African countries). In line with Gaies (2022), we revealed that public health expenditures demonstrate a statistically significant positive impact on GDP per capita growth, while external health expenditures are not so influential (the positive impact of this kind of expenditure on economic growth is not statistically proven). Piech (2022) also focused on researching the relationships between healthcare financing (health expenditure per capita) and economic growth (GDP per capita). She revealed that in low-income countries, economic growth depends on government healthcare expenditures per capita, but is resistant to the influence of private healthcare expenditures per capita. Moreover, she empirically proved that in upper-middle income countries, economic growth is affected by private health expenditures per capita. In contrast, in high-income countries, there is no statistically significant relationship between government or private health expenditures per capita and GDP per capita. Thus, we can conclude that less developed countries are more sensitive to the economic growth impact on health financing.

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