sciendo

DOI 10.2478/sbe-2022-0059
SBE no. 17(3) 2022

DOES TECHNICAL AND DEMOCRATIC GOVERNANCE HAVE THE POTENTIAL TO ENHANCE HEALTH SPENDING ALLOCATIONS?

VĂTAVU Sorana
West University of Timisoara, Faculty of Economics and Business Administration, Finance Department, Timisoara, Romania

ȚĂRAN Alexandra-Mădălina
West University of Timisoara, Doctoral School of Economics and Business Administration, Timisoara, Romania

MOLDOVAN Nicoleta-Claudia
West University of Timisoara, Faculty of Economics and Business Administration, Finance Department, Timisoara, Romania

LOBONȚ Oana-Ramona
West University of Timisoara, Faculty of Economics and Business Administration, Finance Department, Timisoara, Romania

Abstract:

Nowadays, the medical systems of the EU Member States have a need for more efficient public policies and strategies to integrate the new societal challenges, the fragile economic recovery from the COVID-19 pandemic, and sustain the development of health systems. This research explores the relationship between public governance and health expenditures allocation, under the theory of welfare economics and the concern for economic development. The research approaches both qualitative and quantitative methodologies. The first refers to bibliometric analysis and review of the existing literature, followed by data mapping process to rank the EU countries based on the variables employed. The quantitative approach also includes advanced empirical analyses (principal component analysis - PCA and regression analysis) performed over the period 2007-2020. Two indices were created through PCA, technical governance and democratic governance, gathering the effects from different world governance indicators. The main results reveal that both governance indices have a direct influence on health expenditures per capita, while GDP growth, applied as a control variable, negatively influences health expenditures. Our results emphasise a need to redesign the public governance of health systems in terms of health spending allocations and increase investments in healthcare to support economic growth in the long run.

Key words: *public governance, health expenditure, composite indices, regression, EU*

1. Introduction

Governance of health spending should be considered a fundamental component of the healthcare domain, exerting a significant impact on the overall health system's functions (Siddiqi et al., 2009). Progress in improving health status within the coherent actions adopted by society to promote and sustain the health of its citizens nuances the essence of what is called governance of the healthcare systems (Dodgson et al., 2002). Therefore, some demands are arising beyond the health sector. Improving health systems represents a vital process for the entire society. It can also help as the prerequisite for development progress in the long run. Recently, the focus has been placed in the foreground on governance, especially that of health systems, observing the transition from objectives aimed at the micro level to the design of future objectives, including specific characteristics and targets of the various problems focused on the macro decision-making level.

Good governance is considered as being a crucial element for economic growth. Good governance may reflect in improving spending allocations within healthcare outcomes, increasing investments in health systems, and strengthening their performance and the effectiveness of delivered healthcare services (Lewis & Pettersson, 2009). The concept of "good governance" has been widely debated and discussed, including by the World Bank. Over time, many questions arose, the most commonly discussed being the one related to good governance's impact on health spending. Within such a framework, several studies revealed that good governance is needed to increase health spending allocation (Rajkumar & Swaroop, 2008); Klonmp & Haan, 2008, Makura & O'Hare, 2015; Osakede, 2020).

Moreover, considering the discrepancies between the European Union Member States (EU-MS) regarding government quality, urgent demands, the existence of good public governance, adequate allocation in terms of public financial resources, rational public spending, and specific measures to increase the economic performance and welfare (Houngbo et al., 2017; Lu & Zhao, 2019). Accordingly, the delivery of medical care depends on good governance, the returns of an investment and health spending in the medical field being relatively low in the context of unaddressed issues related to governance (Lewis, 2006).

The COVID-19 pandemic post-crisis caused high pressure on the financing of the health systems facing unpredictable challenges, increasing health expenditures for current demands, especially those regarding the health expenditure allocation. Furthermore, the battle against the COVID-19 pandemic exerts financial stress under the share of health spending, revealing that healthcare capacities still face significant challenges and unprecedented vulnerabilities (Khan et al., 2020; Aubrecht et al., 2020). These coordinates were also enclosed in the study of Cristea et al. (2021; 2022), where the authors pointed out the ageing phenomenon and the importance of assistance in health and development, and how the COVID-19 pandemic challenges significantly impact society, with unexpected consequences on public health and economic performance.

In recent years, in managing the global public health crisis caused by COVID-19, the credentials regarding the financing of the health systems, especially health expenditure allocations, are even more critical. Along these lines, based on Agenda 2030 – Sustainable Development Goals, the World Health Organization sustains all countries in exercising

effective health system governance by developing and implementing objectives and strategies to ensure healthy lives and promote society's well-being. Thereby, considering the directions presented above, we affirm that the governance of health systems is fundamental in providing the health systems' financing and adequate health spending allocations.

The novelty of our research is entailed by the new approach centred on the public governance measured by the World Banks' world governance indicators (WGI) divided into two dimensions, technical and democratic governance, within the economic performance conditions, at the level of EU-27 MS. Moreover, the new approach emphasises if the different governance dimensions can improve the health spending allocation and if they impact health spending differently. Based on these underpinnings, we undertook several essential and critical issues in the governance of health spending allocation, designing a comprehensive theoretical framework and employing effective empirical approaches to enhance existing literature.

Our study entails significant contributions in terms of the challenging backgrounds and differences to the existing knowledge. It enhances current literature by offering an integrative approach to the relationship between public governance dimensions and health expenditure allocation through the lens of two different empirical analyses (a multi-analysis technique and regression analysis) from 2007 until 2020. Additionally, the methodology searches for a distinctive approach applied in most studies in the existing literature, employing an in-depth and comprehensive bibliometric analysis and data mapping approach to visually rank the level of selected indicators across the EU-MS.

After this brief introduction appraising the continuous challenge along with the general context and implications of the subject, the rest of the paper is settled as follows. Section 2 presents a detailed and critical theoretical framework and addresses the existing literature review on the scientific field. Section 3 draws up the data comprised and describes the methodology applied. Section 4 brings to the fore the main results obtained within their implications. Finally, section 5 offers conclusive notes and remarks, accompanied by the specific policies and strategies recommended for the EU-27 MS.

2. Literature review

Nowadays, the existing scientific literature offers a great deal of attention to the link between governance and its impact and effects on health spending allocation. It is widely recognised that good governance is considered an essential component in government spending on health, and if missing, it may not yield desirable results. It is noteworthy that governance has a mediating role in the effectiveness of public health spending and the public health sector. It is even more critical to evaluate and assess how the quality of governance can affect health spending, while good health is crucial for economic advancement. At the same time, in less-resourced settings, decision-makers are discussing the need to know how to effectively reinforce the resilience and performance of the health systems (Mikkelsen-Lopez et al., 2011). In this context, the rehabilitation of the health systems requires that the governance objectives and visions need to be oriented towards well-defined and structured frameworks – which are considered essential in promoting good

governance and are aligned with the understanding of the broader context in which they occur, within flexible and coherent public policies across the EU, combining the opportunities of a healthy society with human rights (Amin et al., 2011).

It is recommended that the reform of health systems should not have a one-size-fits-all approach because of the complexities and substantial diversities across the national health systems and due to broad socio-political contexts. Decision-makers should consider principles and strategies of the best practices when there is a continuous need to increase the effectiveness of health expenditure allocation, the health systems' efficiency and performance, and implementing flexible and general policy recommendations regarding the financing of health systems (OECD, 2016).

Osakede (2020) analyses the impact of governance (by employing WGI indicators) on public health spending, evaluating how the quality of governance can directly or indirectly influence health status and the effectiveness of public health spending. The results suggest that the interaction between health spending and various indicators that reflect governance quality, namely government effectiveness, control of corruption, and political stability, tends to influence health outcomes. Otherwise, health spending has no significant role in health outcomes. In addition, the results outline that governance has the potential to foster development, stimulate innovation in health and consequently enhance economic growth and development. Moreover, the authors underlined that policymakers should prioritise the effectiveness of health spending, promoting faster access to high-quality health care and increasing citizens' health status.

Taran et al. (2022) suggest that health spending can be boosted by improving public health policy. Makuta & O'Hare (2015) highlighted that in improving health outcomes, the impact of public expenditure becomes significant; a large effect was observed when the health spending variable interacted with good governance. Consequently, Rajkuman and Swaroop (2008) examined the role of good governance in boosting or decreasing public health spending. The results affirm that a high or low level of efficiency of health spending can be explained by the quality of governance, especially in developing countries. Likewise, Klomp and Haan (2008), in an attempt to provide a critical point of view regarding the effects of good governance on health, argue that governance significantly impacts health only when it positively impacts both income and the quality of the health sector.

Nowadays, challenges can cause different distortions regarding the allocation of public resources. Thus, other factors can influence the financing of health systems and the amount of spending allocated to the health sector. In this regard, Onofrei et al. (2021) attested that the status of good governance and other related economic vulnerabilities have the potential to affect health spending allocations along with health system performance and outcomes.

Kim & Wang (2019) states that not only the activities and priorities of the government can be affected and impacted by the governance, but in particular, it can equally impact the amount of expenditure allocated to the health sector. The authors conducted a study based on the WGI and different public health proxies, measuring the quantity and quality of government health spending. Their results suggested that from these two, the quality government exerts a high impact on public health.

Moreover, Luca et al. (2021) argue that the government is leading in ensuring society's well-being and good health. Thus, effective policies, strategies, and coherent financing health system frameworks are needed to deliver high-performance healthcare services and promote economic performance. However, Lobont et al. (2022) emphasise the need for special attention from policymakers to control corruption for improvement in the public sector's innovation. In the same line, Yaquab et al. (2012) state that economic growth is a key element in promoting good health. The same authors evidenced the relationship between the governance dimension (represented by WGI indicators) and health spending. The results outline that corruption can negatively influence public expenditure and the different health dimensions considered.

Typically, distortions regarding the allocation of health spending and public resources are caused by the run-up of the global financial crisis that poses as a threat to health system resilience and economic performance. In line with this point of view, Makina and Layton (2021) discussed the aggressively deployed policy measures to boost health spending, along with related public debt levels that will indubitably have high pressure on the governments. Additionally, Onoferi et al. (2021) stated that government vulnerabilities during the COVID-19 pandemic could not maintain and ensure adequate funding for health. The authors highlighted that the modernisation and innovation of health systems imply significant pressure on the government budgets and a large health spending allocation in the health sector. The main results suggest a causal relationship between health spending and GDP; an increase in health spending can improve healthcare services and economic performance.

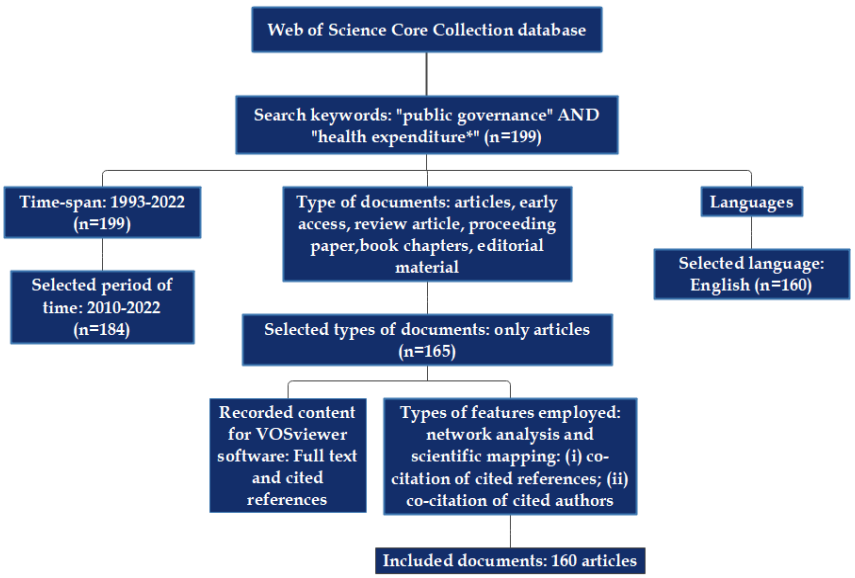
Withal, the link between the longevity and the performance of the states' economies is strongly dependent on the level of investments in the public health sector; governance should manage the amount of health spending, and appropriate strategies should be implemented with the potential to make public sector health funds more efficient. Otherwise, some studies find a noncausal relationship between health sending and economic growth. In this light, Faruk et al. (2022) applied different tests for stationarity and cointegration, Granger Causality and other panel methods. Their research study comprises seven MENA countries from 2000 to 2017. The results revealed that due to poor institutional quality, a high level of health spending does not guarantee an increase in economic growth. Moreover, a high level of investment in the health sector can sustain health spending to impact economic growth positively. In addition, the authors suggest the need for a wide range of strategies and recommendations to enhance the institutional quality representative variables to aid health spending in the long-run process of stimulating economic performance.

Based on the above underpinnings and considering that the literature on governance and health spending allocation in the health sector is comprehensive, we conducted a more complex and in-depth analysis of the state of knowledge by focusing on the most innovative and debated scientific documents, applying a qualitative method, namely bibliometric analysis. According to the literature insights, this approach of the current state of research that provides a scientific mapping of the most relevant documents from the existing literature was also applied by different authors such as Lobont et al. (2020) and Costea et al. (2022). The bibliometric data was collected and extracted from the Web of Science Core Collection database over the 2010-2022 period, including scientific articles

written in English. The search keywords were “public governance” and “health expenditure” and we applied Boolean/Phrase operators to comprise both terms in the resulting scientific documents. Two types of analysis were employed in the VOSviewer software, namely: (i) co-citation of the cited references, to outline the most cited scientific documents; (ii) co-citation of cited authors, to highlight the network of the most prolific authors that impacts the scientific publication overtime on the research subject regarding the impact of governance on health expenditure. The bibliometric process is detailed in Figure 1.

Figure 1. The stages of the bibliometric process

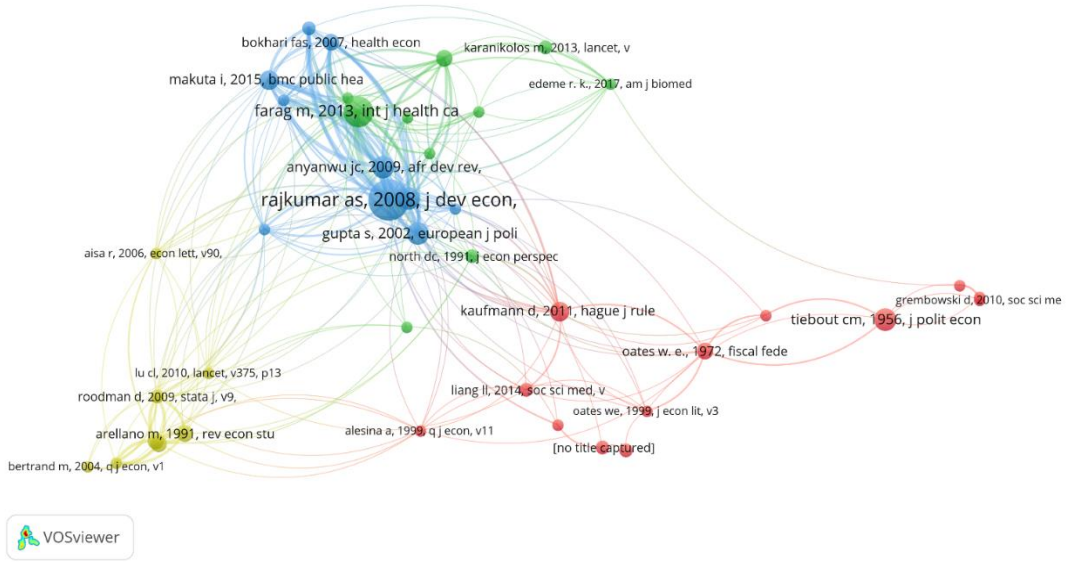
Source: Authors’ process in EdrawMind



Source: Authors’ process in EdrawMind

A qualitative orientation can help objectively assess the most important scientific documents (Culnan, 1987; Garfield, 1979). Besides, through bibliometric analysis, the most cited documents and the most prolific authors in the research field can be observed (Hota et al., 2019). Co-citation analysis helps to assess document similarities and classify them. The main characteristics included in a classification level are as follows: document, authors, journal, and year (Surwase et al., 2011). Nevertheless, co-citation is considered a unique method of analysing the cognitive structure of science, involving pairs of scientific documents cited in the source articles. Co-citation refers to two or more scientific documents that appear in the third bibliographic reference list (Meng et al., 2020). Moreover, the co-cited references tend to share some common scientific subjects and themes, while the co-cited authors’ network outlines the most productive ones. The main purpose of the co-citation analysis is to extract the most cited documents and authors by identifying the main clusters and to represent the results from a graphical perspective.

Figure 2. Co-citation network in terms of cited-references

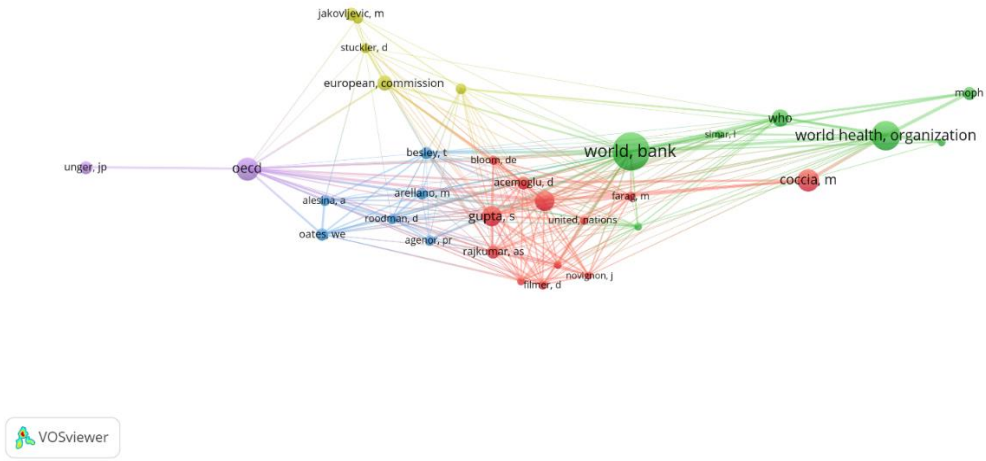


Source: Authors' process in VOSviewer

Figure 2 represents the network analysis regarding the co-citation of cited references regarding the relationship between governance and health spending and highlights the most relevant bibliographical documents. A threshold of four citations/references was set, and only 42 references met the eligibility criteria of inclusion, with 41 connected. The red cluster, with 13 references, is led by the paper of Tiebout, which has eight citations. The green and blue clusters have ten references each, with the highest number of citations (11) for Farag's research, and 15 citations for the author Rajkumar. The fourth cluster (yellow) encompasses eight references, with the highest number, six citations, for both documents of Arellano.

Rajkumar and Swaroop (2008) find that good governance can significantly improve the impact of public spending on health systems. Farag et al. (2013) state that developing countries are facing major challenges in improving their citizens' health. After investigating the relationship between government health spending and health outcomes, it became obvious that good governance improves health outcomes, depending on each country and the need for investment in health services.

Figure 3. Co-citation network by cited-authors



Source: Authors' process in VOSviewer

Figure 3 represents the co-citation network of cited authors. The scientific network allowed us to examine and measure the intensity of the connections between cited authors. As a limiting factor, a minimum number of nine citations was applied and, out of the total amount of articles (n=5678), only 33 of them met the eligibility criteria, and 32 were connected to each other. The map evidence five different clusters, reported in Table 1, and thicker lines illustrate concurrent citations between the cited authors. The highest number of citations is not attributed only to individual researchers, but also to institutions and international organisms.

Table 1. Clusters of cited authors and citations

Cluster 1 (red)	Citation/ Cited Author	Cluster 2 (green)	Citation/ Cited Author	Cluster 3 (blue)	Citation/ Cited Author
Acemoglu, D.	17	Ministry of Health	9	Agenor, P.R.	12
Anyanwu, J.C.	9	Moph	17	Alesina, A.	13
Bloom, D.E.	11	Simar, L.	9	Arellano, M.	14
Coccia, M.	33	Wagstaff, A.	9	Besley, T.	15
Farag, M.	11	WHO	23	Oates, W.E.	15
Filmer, D.	11	World Health Organization	46	Roodman, D.	12
Gupta, S.	29	World Bank	63	**Cluster 5 (purple)**	**Citation/ Cited Author**

Kaufmann, D.	28	**Cluster 4 (yellow)**	**Citation/ Cited Author**	OECD	34
Novignon, J.	9	European Commission	20	Unger, J.P.	16
Pritchett, L.	9	Jakovljevic, M.	16		
Rajkumar, A.S.	16	Mays, G.P.	13		
United Nations	10	Pesaran, M.H.	13		
		Stuckler, D.	12		

Source: authors' process from VOSviewer

The highest number of citations was received by different international organisations, such as World Bank (63 citations), closely followed by the World Health Organization - WHO (46 citations), and OECD (34 citations). Besides, the results suggest that authors like Coccia (33 citations), Gupta (29 citations), and Kaufmann (28 citations) are also in top of the citations' ranking. WHO (2014) has launched different action plans that focus on the governance of health systems, implying good governance and the financing of the health systems as critical and relevant to other components of society. Acquiring this goal requires good governance, which positively influences health services and their quality, infrastructure, health information and workers, especially health system financing and health spending allocation. Withal, the World Bank (2015) addressed issues related to finance, health, poverty, and others by applying insights from modern behavioural and social sciences. Likewise, OECD launched the "Health Project 2011" initiative underlining the necessity of improving the health systems' performance and addressing a wide series of key challenges that policymakers face.

By identifying the main investigation opportunities of content and bibliometric analysis we provided an overview of the state of the art and proper evidence on the investigation of governance and health expenditure allocation.

3. Data and Methodology

Relying on the main finding from the existing literature review and considering our paper's research objective of, we divided data into four groups of indicators that target governance (with technical governance and democratic governance), health, and economic performance. To measure the governance implications upon health spending allocation, we chose several indicators based on the existing literature: the world governance indicators (WGI) for the governance component and the economic performance, namely the GDP growth rate. Regarding the health dimension, we account for the current health expenditure per capita variable. Moreover, to weigh the activities and practices of public administration authorities, namely public governance, we employed the WGI, ranged between -2.5 and 2.5. To measure the governance size, we divided it into two dimensions, (i) technical governance and (ii) democratic governance, according to Huang and Ho (2018). Hence, our dataset encompasses the following indicators, clustered into four groups:

1. Technical governance representative indicators: Government effectiveness (goveff), Regulatory quality (regqual), Rule of law (rulelaw), and Control of corruption (contcorr);

2. Democratic governance indicators: Voice and accountability (voiceacc); Political stability and absence of violence (polstab);

3. Health dimension indicator: Current health expenditure per capita (hexp), in current US$;

4. Economic performance indicator: GDP growth rate (GDPgr), as annual %.

The meaning of each dimension indicator is synthesised in Table 2. All indicators were extracted from The World Bank database from 2007 until 2022.

Table 2. The description of selected variables

Source: authors' process based on World Bank (2014)

Indicator	Definition
Government effectiveness	"captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies" (World Bank, 2014).
Regulatory quality	"perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development" (World Bank, 2014).
Rule of law	"perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence" (World Bank, 2014).
Control of corruption	"perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as capture of the state by elites and private interests" (World Bank, 2014).
Voice and accountability	"captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media" (World Bank, 2014).
Political stability and absence of violence	"measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism" (World Bank, 2014).
Current health expenditure per capita	Current health expenditure grasps health care goods along with services consumed during each year.
GDP growth rate	GDP growth rate reflects the sum of gross value added (by all residents producers in the economy) and any product taxes excluding the subsidies that are not included in the value of the products, being calculated, on the one hand, without any deduction for the depreciation of fabricated assets, and, on the other hand, for depletion/degradation of natural resources.

The summary statistics of all the indicators employed in the econometric analysis, considering the entire sample of the 27 European Union Member States (EU MS), are presented in Table 3.

Table 3. Descriptive statistics (2007-2020, EU-27)

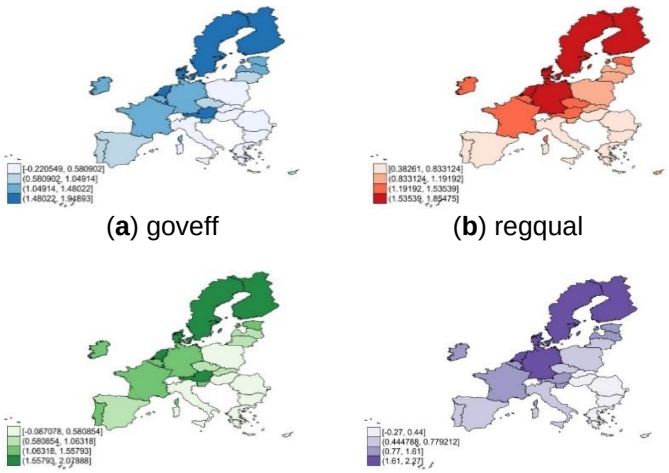
Variables	N	Mean	Standard deviation	Min	Max
goveff	378	1.09	0.57	-0.35	2.35
regqual	378	1.18	0.43	0.14	2.05
rulelaw	378	1.10	0.60	-0.13	2.12
contcorr	378	0.98	0.79	-0.50	2.45
voiceacc	378	1.08	0.34	0.26	1.69
polstab	378	0.74	0.37	-0.47	1.51
hexp	351	7.68	0.79	5.88	8.94
GDPgr	378	1.32	4.04	-14.83	25.17

Source: authors' process in Stata 17

In Figures 4 and 5, we mapped the representative indicators for technical and democratic governance across the EU-27, expressed by WGI, in 2020. Considering the technical governance indicators, i.e. governance effectiveness (Figure 4a) and control of corruption (Figure 4d), the strapping outcomes were achieved by several Nordic States (Finland, Denmark, and Sweden). Besides, a great perception of regulatory quality (Figure 4b), along with a significant degree of confidence as regards the rules of society, respectively the rule of law (Figure 4c), was observed in Estonia, Latvia, Germany, Netherlands, Finland, Sweden, and Denmark.

Focusing on the indicators related to democratic governance, a notable level of voice and accountability (Figure 5a) and political stability (Figure 5b) was in Sweden, Finland, and even Portugal. Otherwise, the lowest levels of voiceacc are registered by CEE countries (Romania, Bulgaria, Hungary, Lithuania, and Slovakia) and also Poland. On the other hand, the lowest-ranking outcomes of polstab were counted in Romania, Bulgaria, Hungary, Greece, Malta, and even Italy.

Figure 4. Technical governance in EU-27, 2020: (a) government effectiveness; (b) regulatory quality; (c) rule of law; (d) control of corruption

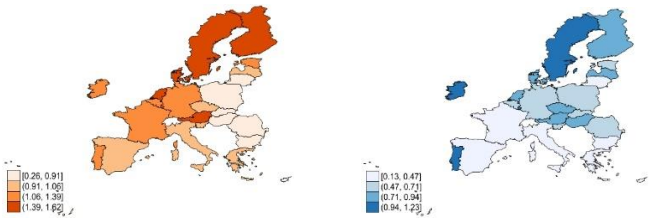


(**a**) goveff (**b**) regqual

(**c**) rulelaw (**d**) contcorr

Source: authors' process in Stata 17

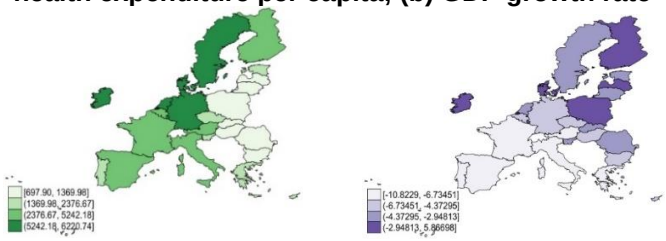
Figure 5. Democratic governance credentials in EU-27, 2020: (a) voice and accountability; (b) political stability and absence of violence



(**a**) voiceacc (**b**) polstab

Source: authors' process in Stata 17

Figure 6. Health and economic performance credentials in EU-27, 2020: (a) Current health expenditure per capita; (b) GDP growth rate



(**a**) hexp (**b**) GDPgr

Source: authors' process in Stata 17

From figure 6 we observe the highest levels of the current health expenditure per capita in the Nordic countries (Finland, Sweden, and Denmark), alongside Germany and the Netherlands. On the contrary, the lowest values are identified in Romania, Bulgaria, Hungary, Lithuania, Slovakia, and Latvia. The highest concentration in terms of the GDP growth rate is registered in Finland, Latvia, Poland, and Denmark, while a decreasing trend and lowest values is observed in France, Spain, Portugal, Italy, and Greece.

After observing the descriptive statistics and the hierarchy of the indicators in the EU, we address several econometric methods to outline the statistical relationship between governance and health expenditures, through correlations, principal component analysis (PCA) and regression analysis. We expect strong correlations between WGI and apply the PCA to reduce the governance dimensions and subtract most information from our database to the technical and democratic governance dimensions. Furthermore, we test the influence of these two governance dimensions (individually, because we expect a strong correlation between the two indices resulting from PCA) on health expenditures through the regression analysis. We will test the ordinary least squares (OLS) model, fixed (FE) and random effects (RE) model, also considering the growth in GDP as a control variable, to overview the robustness of the results. The basic form of the regression equations tested is presented below:

$$hexp_{it} = \alpha_i + \beta\, techgov_{it} + \varepsilon_{it} \quad (1),$$

$$hexp_{it} = \alpha_i + \beta\, demgov_{it} + \varepsilon_{it} \quad (2),$$

$$hexp_{it} = \alpha_i + \beta_1\, techgov_{it} + \beta_2\, GDPgr_{it} + \varepsilon_{it} \quad (3),$$

$$hexp_{it} = \alpha_i + \beta_1\, demgov_{it} + \beta_2\, GDPgr_{it} + \varepsilon_{it} \quad (4),$$

where α represents the intercept for every country (i=1..27), the period analysed is observed through t=2007..2020, the βs represent regression coefficients of the explanatory variables, and ε_{it} is the error term.

3. Results

The Pearson correlation matrix is presented in table 4. There is strong evidence that the WGI are interconnected due to correlation coefficients of 0.8 or more. This consists of a strong reason to reset the WGI and construct indices with PCA. Except for GDP growth, which has a negative influence on the level of health expenditures, all governance indicators are expected to carry a positive influence on the dependent variables (hexp).

Table 4. Correlations between health expenditure, WGI and GDP growth

	hexp	**goveff**	**regqual**	**rulelaw**	**contcorr**	**voicecc**	**polstab**	**GDPgr**
hexp	1							
goveff	0.8349*	1						
regqual	0.7221*	0.8684*	1					
rulelaw	0.8399*	0.9510*	0.8984*	1				
contcorr	0.8500*	0.9410*	0.8878*	0.9525*	1			
voiceacc	0.8757*	0.9095*	0.8814*	0.9362*	0.9298*	1		
polstab	0.4250*	0.6102*	0.5853*	0.6041*	0.5613*	0.5882*	1	
GDPgr	-0.0916	0.0019	0.0793	0.0207	0.0141	0.0042	0.1683*	1

p<0.05, statistically significant at 5% level

We proceed to the principal component analysis to construct one dimension for technical governance and one for democratic governance, based on the model proposed by Huang and Ho (2018). The PCA results are summarised in table 5. According to the eigen values, after applying the PCA to the overall dataset on governance, there is one index able to gather the effect from the four WGI indicators related to technical governance (Government effectiveness, Regulatory quality, Rule of law, Control of corruption). Based on the factor loadings, which have positive values, the world governance indicators carry a direct influence on the index constructed for technical governance (techgov). For the second dimension, there is also one index able to gather the effect from the WGI indicators related to democratic governance (Voice and accountability, Political stability and absence of violence). Once again, results from the factor loadings prove a positive influence from both WGI on the index constructed to express democratic governance (demgov).

Table 5. Indexes resulted from the principal component analysis for WGI

Component	Eigen value	Cumulative proportion	Variable	Factor loadings	Index resulted
Comp1	3.7505	0.9376	goveff	0.5016	**(PC) techgov**
Comp2	0.1489	0.9748	regqual	0.4868	
Comp3	0.0574	0.9892	rulelaw	0.5071	
Comp4	0.0432	1.000	contcorr	0.5043	
Comp1	1.5882	0.7941	voiceacc	0.7071	**(PC) demgov**
Comp2	0.4118	1.000	polstab	0.7071	

The results from the linear regression analysis are listed in table 6. Before discussing them, we add that there is a strong correlation between the two indices, techgov and demgov, based on a statistically significant coefficient of 0.87. Therefore, we confirm that a linear regression should consider them individually as an independent variable while having both indices in the same model might distort the results due to auto-correlation issues.

Table 6. Comparative regression results (dependent variable: health expenditures)

	OLS model				FE model				RE model			
techgov	0.34***	0.34***			0.12***	0.113***			0.16***	0.166***		
	(0.012)	(0.012)			(0.012)	(0.021)			(0.019)	(0.019)		
demgov			0.450***	0.457***			0.018	0.196			0.451**	0.057***
			(0.023)	(0.022)			(0.020)	(0.020)			(0.021)	(0.021)
GDPgr		-0.02***		-0.03***		-0.002		-0.003		-0.002		-0.003
		(0.006)		(0.008)		(0.002)		(0.002)		(0.002)		(0.002)
constant	7.68***	7.72***	7.68***	7.74***	7.68***	7.69***	7.687***	7.692***	7.68***	7.69***	7.686***	7.692***
	(0.022)	(0.025)	(0.029)	(0.031)	(0.006)	(0.007)	(0.006)	(0.007)	(0.084)	(0.077)	(0.105)	(0.09)
R-sq.	0.7037	0.7110	0.5245	0.5455	0.7281	0.7335	0.5741	0.6582	0.7281	0.7314	0.5741	0.6082
F-test/ Wald-chi sq.	832***	431***	387***	211***	31.3***	16.31***	0.82	1.6	69.3***	78.40***	4.77**	9.63***
				Hausman test	34.1***	43.49***	-88.26	-61.4				

Standard errors in parentheses; ***, ** represent significance at 1% and 5% levels, respectively

Results indicate a direct influence on health expenditure from both governance indexes - technical and democratic governance – although the first one seems to have a greater chance of increasing health expenditure at EU level. Moreover, the Hausman test, employed to test our database for the model with a better fit, of fixed or random effects indicates that characteristics of the countries would influence the connection between technical governance and health expenditures. For the models referring to the techgov variable, the fixed effects are more appropriate. However, democratic governance seems to have an impact which is less significant on hexp, being more relevant through the random effects model (which was also suggested from the hausman test). In terms of GDP growth, this carries a negative influence towards current health expenditure; after including this control variable, previous regression results were confirmed, satisfying the robustness check

of the analysis. Even in the previous research set up by Huang and Ho (2018), the democratic quality index had regression coefficients with less statistical significance than those associated with technical governance.

Our study brings more information to the current literature, as our approach is different than the one applied in previous studies, in terms of the variables employed in the analysis. Although in terms of the negative influence of GDP growth on health expenditure, our results contradict those from previous studies, such as Yaquab et al. (2012) or Gupta et al. (2022), we confirm the direct influence of good governance on a better performant health system (evidenced by Rajkuman and Swaroop, 2008 or Onofrei et al., 2021). We also emphasise through our results that the EU-27 states have specific health systems and characteristics able to influence the relationship between governance and health expenditures.

4. Conclusions

In recent years, despite the common efforts of the EU countries, it has been noticed that the quality of the governance of health systems, especially their health spending allocation, has not been substantially improved. Likewise, with the multiple effects of the unforeseen crises and all the challenges and vulnerabilities brought to the surface following the COVID-19 pandemic, good governance needs to have the necessary abilities to ensure health spending allocation.

This paper contributes with an in-depth overview of the implications of governance on the expenditures allocated to the health domain, by analysing the relationship between good public governance and health spending allocation in the EU. Along these lines, the general objective was to assess the implications of health expenditure allocation, at the level of EU-27 Member States, under the impact of governance indicators (distinctively divided into democratic governance and technical governance) and economic performance.

Moreover, the bibliometric analysis provides a scientific visualisation by identifying and mapping the most cited references and authors, through co-citation analysis. The results allowed us to observe the most prominent cited authors regarding the relationship between public governance and health expenditure, respectively (i) in terms of international organisations - WHO, OECD, World Bank, and (ii) in terms of individual researchers – Coccia, Gupta, Kaufmann, and to measure the intensity of the connection between them. A second contribution is based on identifying the top-cited references, under the selected parameters. Our paper offers a content analysis of the most relevant scientific documents in the field, by analysing the most popular topics.

Upheld on two advanced econometric techniques, PCA and regression, our findings entail the existing literature and offer new and interesting insights that lead to important upwards regarding the role of governance in ensuring the health spending allocations across the EU-27.

The results also provide a straightforward direction for the decision-makers and for the public authorities to improve their activities and increase the level of world governance indicators associated with the country, supporting in this way a higher level of health spending allocation. Although all WGI have a direct influence on health expenditures, we

expect more impact from the technical governance, encompassing citizens' perceptions towards the quality of public services, the government's ability to implement sound policies and regulations, abiding by the rules of society and also perceiving less corruption from public authorities.

Based on our literature review and research study, a series of policy guidelines can be drawn: (i) the need to improve policies for better governance of health spending allocation by setting different targets for financing the health systems, but also policies for reducing corruption; (ii) to improve and strengthen the governance of health spending allocations and to approach strategies aimed at improving the health of citizens and increasing economic performance; (iii) specific policies and tailored strategies must be drawn by all the governments across the EU in order to enhance new opportunities for financing health systems and boosting the economic performance.

Future research could consider sub-sampling the EU-27 database into categories of states with a similar level of economic development, especially after the comparative regression analysis proved that countries' characteristics might have some influence on the results.

5. References

Amin, M., MacLachlan, M., Mannan, H., El Tayeb, S., El Khatim, A., Swartz, L., Munthali, A., Gert Van, R., McVeigh, J., Schenider, M., (2011), *EquiFrame: a framework for analysis of the inclusion of human rights and vulnerable groups in health policies,* Health and Human Rights, vol. 13, no. 2, pp. 1–20.

Aubrecht, P., Essink, J., Kovac, M., Vandenberghe, A. S., (2020), *Centralized and Decentralized Responses to COVID-19 in Federal Systems: US and EU Comparisons,* SSRN Electronic Journal.

Coccia, M., (2020), *How (Un)sustainable Environments Are Related to the Diffusion of COVID-19: The Relation between Coronavirus Disease 2019, Air Pollution, Wind Resource and Energy.* Sustainability, vol. 12, no. 22, p. 9709.

Costea, F., Taran, A.-M., Lobont, O.-R., (2022), *Scientific Contextualization of the Public Policy and Entrepreneurship Nexus,* "Ovidius" University Annals, Economic Sciences Series, vol. 22, no. 1, pp. 844-853.

Cristea, M., Noja, G.-G., Jurcuţ, C.-N., Ponea, C.-Ş., Caragiani, E.-S., Istodor, A.-V., (2021), *The Interplay between Public Health, Well-Being and Population Aging in Europe: An Advanced Structural Equation Modelling and Gaussian Network Approach,* International Journal of Environmental Research and Public Health, vol. 18, no. 4.

Cristea, M., Pirtea, M.G., Suciu, M.C., Noja, G.G, (2022), *Workforce Participation, Ageing, and Economic Welfare: New Empirical Evidence on Complex Patterns across the European Union,* Complexity, vol. 2022, Article ID 7313452.

Culnan, M. J., (1987), *Mapping the Intellectual Structure of MIS, 1980–1985: A Co-Citation Analysis.* MIS Quarterly, vol. 11, no. 3, p. 341.

Dodgson, R., Lee, K., Drager, N., (2002), *Global Health Governance: A Conceptual Review* (Discussion Paper no.1). London: Centre on Global Change & Health (London School of Hygiene & Tropical Medicine), Geneva, Switzerland: Department of Health and Development. Available online http://apps.who.int/iris/bitstream/10665/68934/1/a85727_eng.pdf.

Farag, M., Nandakumar, A.-K., Wallack, S., Hodgkin, D., Gaumer, G., Erbil, C., (2013), *Health expenditures, health outcomes and the role of good governance,* International Journal of Health Care Finance and Economics, vol. 13, no. 1, pp. 33–52.

Faruk, B.-U., Haque, M.-I., Tausif, M.-R., Khan, M.-R., (2022), *The association between health expenditure, institutions, and economic growth in MENA countries,* Health Promotion Perspectives, vol. 12, no. 1, pp. 92-100.

Garfield, E., (1979), *Is citation analysis a legitimate evaluation tool?* Scientometrics, vol. 1, no. 4, pp. 359–375.

Gupta, S., Verhoeven, M., Tiongson, E.-R., (2002), *The effectiveness of government spending on education and health care in developing and transition economies,* European Journal of Political Economy, vol. 18, no. 4, pp. 717–737.

Hota, P.-K., Subramanian, B., Narayanamurthy, G., (2019), *Mapping the Intellectual Structure of Social Entrepreneurship Research: A Citation/Co-citation Analysis,* Journal of Business Ethics, vol. 166, no. 1, pp. 89–114.

Houngbo, P.T., Coleman, H.-L.-S., Zweekhorst, M., De Cock Buning, T., Medenou, D., Bunders, J.F.G., (2017), *A model for good governance of healthcare technology management in the public sector: Learning from evidence-informed policy development and implementation in Benin,* PLoS ONE, vol. 12.

Huang, C.-J., Ho, Y.-H., (2018), *The Impact of Governance on Income Inequality in Ten Asian Countries,* Journal of Reviews on Global Economics, vol. 7, pp. 217–224.

Kaufmann, D., Kraay, A., Mastruzzi, M., (2011), *The Worldwide Governance Indicators: Methodology and Analytical Issues,* Hague Journal on the Rule of Law, vol. 3, no. 2, pp. 220–246.

Khan, S., Liu, J., Xue, M., (2020), *Transmission of SARS-CoV-2, Required Developments in Research and Associated Public Health Concerns,* Frontiers in Medicine, vol. 7.

Klomp, J., De Haan, J., (2008), *Effects of Governance on Health: a cross-national analysis of 101 countries,* Kyklos, vol. 61, no. 4, pp. 599–614.

Lewis M., Pettersson, G., (2009), *Governance in Health Care Delivery: Raising Performance,* Washington: World Bank; 2009. Available online http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/10/13/000158349_20091013151915/Rendered/PDF/WPS5074.pdf.

Lobonț, O.-R., Nicolescu, A.-C., Costea, F., Li, Z.-Z., Țăran, A.-M., Davidescu, A., (2022), *A Panel Threshold Model to Capture the Nonlinear Nexus between Public Policy and Entrepreneurial Activities in EU Countries,* Mathematics, vol. 10, no. 8, p.1265.

Lobont, O.-R., Taran, A.-M., Costea, F., (2020), *E-Government Research Still Matter? A Bibliometric Analysis,* Annals of Dunarea de Jos University of Galati. Fascicle I. Economics and Applied Informatics, vol. 26, no. 2, pp. 58–63.

Lu, J., Zhao, J., (2019), *How does government funding affect nonprofits' program spending? Evidence from international development organizations,* Public Administration and Development, vol. 39, pp. 69–77.

Luca, M.-M., Mustea, L., Taran, A., Stefea, P., Vatavu, S., (2021), *Challenges on Radical Health Redesign to Reconfigure the Level of e-Health Adoption in EU Countries,* Frontiers in Public Health, vol. *9*.

Lewis, M., (2006), *Governance and Corruption in Public Health Care Systems*, Centre for Global Development, Working Paper no. 78. Available online http://www.cgdev.org/sites/default/files/5967_file_WP_78.pdf.

Makin, A.-J., Layton, A., (2012), *The global fiscal response to COVID-19: Risks and repercussions.* Economic Analysis and Policy, vol. 69, pp. 340–349.

Makuta, A., O'Hare, B., (2015), *Quality of governance, public spending on health and health status in Sub Saharan Africa: a panel data regression analysis,* BMC Public Health, vol. 15, no. 1, p. 932.

Meng, L., Wen, K.-H., Brewin, R., Wu, Q., (2020), *Knowledge Atlas on the Relationship between Urban Street Space and Residents' Health—A Bibliometric Analysis Based on VOSviewer and CiteSpace,* Sustainability, vol. 12, no. 6, p. 2384.

Mikkelsen-Lopez, I., Wyss, K., de Savigny, D., (2011), *An approach to addressing governance from a health system framework perspective,* BMC Int Health Hum Rights, vol. 11, no. 13, pp.1–11.

Organisation for Economic Co-operation and Development - OECD, (2010), *Health Care Systems: Getting More Value for Money,* OECD Economics Department Policy Notes (No. 2). Paris: OECD Economics Department.

Onofrei, M., Cigu, E., Gavriluta (Vatamanu), A. F., Bostan, I., Oprea, F., (2021), *Effects of the COVID-19 Pandemic on the Budgetary Mechanism Established to Cover Public Health Expenditure. A Case Study of Romania,* International Journal of Environmental Research and Public Health, vol. 18, no. 3, p. 1134.

Onofrei, M., Vatamanu, A. F., Vintilă, G., Cigu, E., (2021), *Government Health Expenditure and Public Health Outcomes: A Comparative Study among EU Developing Countries,* International Journal of Environmental Research and Public Health, vol. 18, no. 20, p. 10725.

Osakede, U.-A., (2020), *Public health spending and health outcome in Nigeria: the role of governance,* International Journal of Development Issues, vol. 20, no. 1, pp. 95–112.

Rajkumar, A.-S., Swaroop, V., (2008), *Public spending and outcomes: does governance matter?,* Journal of Development Economics, vol. 86, no. 1, pp. 96–111.

Siddiqi, S., Masud, T.-I., Nishtar, S., Peters, D.-H., Sabri, B., Bile, K.-M., Jama, M.-A., (2009), *Framework for assessing governance of the health system in developing countries: Gateway to good governance,* Health Policy, Vol. *90, no.*1, pp. 13–25.

Surwase, G., Sagar, A., Kademani, B.-S., Bhanumurthy, K., (2011), *Co-citation analysis: an overview*, pp.179-185.

Țăran, A.-M., Mustea, L., Vătavu, S., Lobonț, O.-R., Luca, M.-M., (2022), *Challenges and Drawbacks of the EU Medical System Generated by the COVID-19 Pandemic in the Field of Health Systems' Digitalization,* International Journal of Environmental Research and Public Health, vol. 19, no. 9, p. 4950.

The World Bank, (2019), *Worldwide Governance Indicators (WGI).* Available online: http://info.worldbank.org/governance/wgi/.

World Bank, (2014), *World development report 2015: Mind, society, and behavior*. The World Bank.

World Health Organization, (2014), *Health systems governance for universal health coverage action plan: department of health systems governance and financing.*

Yaqub, J.-O., Ojapinwa, T.-V., Yussuff, R.-O., (2012), *Public health expenditure and health outcome in Nigeria: The impact of governance,* European Scientific Journal, vol. 8.