

**The Role of Government Health Expenditure in Driving Economic Growth:  
Evidence from OECD Countries**

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**Abstract:** This study examines the influence of government health expenditure and life expectancy on economic growth. The study makes use of panel data analysis and utilizes data from the OECD nations between 2000 and 2021. The study applies panel data analysis using POLS, FEM and REM models and dynamic GMM models. The study also gauges the moderating role of life expectancy on the relationship between government health expenditure and economic growth. The results indicate that government expenditure on health hurts economic growth. A detrimental relationship between life expectancy and economic growth indicates that higher life expectancy could result in elevated healthcare and financial expenses. Nevertheless, the interactive regression model suggests that there is no significant moderation of the association between government expenditure on health and economic growth by life expectancy, implying that the influence of government health expenditure on economic growth is generally unaffected by demographic changes. These findings emphasize the significance of differentiating between the short-term and long-term economic consequences of healthcare expenditure. This study offers insights into the optimization of public spending in OECD nations to promote sustainable economic growth and enhance public health outcomes.

**Keywords:** *Economic Growth, Government Health Expenditure, Life Expectancy, OECD Countries.*

## 1. Introduction

The global COVID-19 pandemic has demonstrated that the state of health and well-being is a crucial determinant for maintaining an economy and promoting growth in the economy. In the Trade Policy Paper of the Organisation for Economic Co-operation and Development (OECD, 2022), infectious diseases are identified as one of the primary causes of death, contributing to 25% to 30% of global mortality. The report suggested that the global real Gross domestic product (GDP) has declined by 2.3%. Poorer worker productivity across all industries and geographical regions is the primary cause of this reduction, which alone results in a 4.6% decline in global real GDP. Many advantages that contribute to economic growth result from a healthy population. An advancement in human and physical capital enhances productivity and GDP per capita (Neofytidou & Fountas, 2020). A healthy population is more resilient and better able to withstand economic shocks during times of crisis.

Amidst these changes, there has been much focus on the impact of government health expenditures on economic growth. Despite substantial changes in government expenditure on health, there exists ambiguity regarding its relationship with economic growth. According to Jiang and Wang (2023), a decrease in immediate government spending on healthcare results in a 10.99% decrease in the GDP per capita. This has proven that government health expenditure has a significant relationship with economic growth. It is reasonable to argue that government has constraints in adjusting its healthcare expenditure because of the rigidity of budgetary and fiscal systems (Jay, Peng, Xuezheng, & Shufang, 2013, Jiang & Wang, 2023). Although governments around the world have made significant investments in health, the impact of these expenditures on economic growth is still a topic of continuous discussion.

In addition, life expectancy plays a significant role in impacting the efficacy of government health expenditure in fostering economic growth. A strand of studies extensively discussed The association between economic growth and maternal mortality ratio is moderate yet beneficial. For example, a study by Islam, Mondal, & Haitham (2023) showed a significant negative relationship between economic growth and infant mortality, vehicular mortality and healthcare spending. Thus, this indicates that life expectancy has a moderating effect on government health expenditure and economic growth. Moreover, a study by Shafi and Samreen (2019)

suggested that life expectancy in G7 countries increases steadily with the increase in per capita income of the GDP. Nations that had significant growth in life expectancy, as a result of the sudden decrease in mortality show lower rates of economic growth per capita. Furthermore, a detrimental correlation is observed between the starting level of life expectancy and the subsequent rate of rise in GDP per capita. On the other hand, an increase in life expectancy had a detrimental effect on the growth rate of GDP per capita. It reveals that the reverse mechanism, where income affects health, explains a significant portion of the positive correlations between life expectancy and GDP per capita across different countries (Hansen & Lars, 2015).

Additionally, an increase in expenditure does not necessarily result in an improvement in healthcare. The actual level of health expenditure in nations that are members of the OECD amounts to 5.48 percent of GDP, while simultaneously, the economic growth rate is 1.87 percent (Wang, 2015). After taking into account the effects of inflation, the total amount of money spent on health care around the world in 2019 was 8.5 trillion dollars, which is more than twice as much as the amount spent in 2000, which was 4.2 trillion dollars. Approximately 60 % of the costs associated with healthcare were covered by the government, while forty percent were covered by private sources inside the country. Only 0.21 % of the entire cost of healthcare was accounted for by assistance from outside sources. During the same period, the Gross Domestic Product (GDP) of the entire world increased by 74%, going from 50 trillion dollars to 86 trillion dollars. Because of this, the percentage of the world's gross domestic product that is allocated to health spending has increased from 8.5% to 9.8% (WHO, 2021).

Therefore, this study aims to examine the relationship between government health expenditure and economic growth. The study also intends to gauge the moderating role of life expectancy on the relationship between government health expenditure and economic growth. This study focuses on 38 OECD countries for a period from 2000 to 2021. These nations have reliable data on government health spending and economic indicators, allowing for comprehensive analysis. The OECD's focus on policy cooperation and best practices provides a valuable framework for assessing how health spending impacts economic growth. By studying OECD countries, this study benefits from high-quality data, cross-national comparisons, and insights into the relationship between healthcare spending and economic growth. Previous studies show that reducing health spending can significantly lower GDP per person, indicating a short-run link between GHE and economic performance (Jiang & Wang, 2023). Countries with rising life expectancy indicate changes in GDP growth, influenced by factors such as mortality rates and healthcare spending (Islam, Mondal & Haitham, 2023).

## **2. Literature Review and Hypotheses Development**

### **Theoretical consideration**

Keynesian economics emphasizes the concept of the "multiplier effect," which suggests that a small increase in government expenditure such as, on healthcare, can result in a significantly greater growth in overall economic activity. This theory offers a framework for comprehending how public health expenditure could enhance economic growth. An increase in health expenditures has the potential to stimulate economic growth by increasing labor productivity and reducing the costs of healthcare for both individuals and businesses within the economy. In the long run, consistent investments in health care have the potential to bring about improvements in human capital over time, which is critical for sustained economic success. A strand of studies has been done to assess the relationship between the expansion of the economy and the expenditures made by the government on healthcare. A recent study by Ekong, Paul, & Alex (2024) shows that Nigeria's healthcare expenditures had a significant and positive influence on inclusive growth. The findings of this study lend credence to Keynesian ideas, which advocate for the implementation of active fiscal policies to improve economic performance. It is also evidence that in the long-term, government expenditure, including health care spending has positively influenced the economy's expansion (Ozoemene et al., 2024 and Buthelezi, 2023) and health spending indirectly increases economic growth through higher labor productivity (Alwago, 2023).

Furthermore, public health spending is consistent with both Wagner's and Keynesian theories, demonstrating a clear connection between higher health expenditure and economic growth such as studies done by (Bello & Syder, 2024 and Aderobaki and Falope, 2024). Investments in people's health, education, and other aspects of human capital will have a favorable impact on the economy (Grossman, 1999). Societies that make investments in people's health and well-being see a rise in productivity and economic prosperity. Although increasing health

capital always promotes economic growth, the overall impact of health on the pace of economic growth relies on how it impacts the accumulation of physical capital (Gong, Li, & Wang, 2012) and better health boosts productivity and efficiency at work. Healthy people use fewer sick days, are better equipped to execute their jobs both intellectually and physically and make more of an economic contribution (Litchenberg, 1992). In conclusion, the Keynesian economic theory highlights the significance of government intervention in promoting economic growth and maintaining stability in the economy by implementing fiscal policies, especially on public healthcare expenditure.

### **Hypotheses Development**

#### Government health expenditure and Economic growth

Studies have shown that the health of a nation has many impacts on its economic progress. As a nation's health improves, it can generate greater output using a fixed combination of human capital, technical expertise, and skills (Kareem et al., 2017). Government spending on healthcare had a lesser impact on economic growth when compared to expenditures on infrastructure, education, and agriculture, all of which had greater impacts (Magai & Rosemary, 2023). This is because when they increase income, individuals will foster positive habits or enhance health throughout a person's lifetime (Oni, Aninkan, & Akinsanya, 2014). It is also evidence that in the long term, population health has influenced economic growth and is a crucial determinant of economic productivity as proposed by the endogenous growth models (Dauda, 2011). In addition, a sustained economic expansion is fostered by both public and private investments within the country, together with expenditures on healthcare (Al Shahrani & Al Sadiq, 2014). Therefore, this study proposes a hypothesis as below:

**H<sub>1</sub>:** *There is a significant relationship between Government health expenditure and Economic growth.*

#### Life expectancy and economic growth

The Keynesian paradigm recognizes the substantial influence of population health on a nation's economic progress, as evidenced by its incorporation of life expectancy as an investment metric. The analysis reveals a statistically significant and negative correlation between life expectancy and economic inequality across different countries and throughout time, even after controlling for factors such as income and poverty (Hansen, 2015). Overall, the increase in life expectancy, which led to a higher population, originally resulted in a fall in income per capita. However, this negative effect gradually lessened over the next four decades. Insufficient empirical evidence exists to substantiate the claim that the increase in life expectancy has led to a rapid increase in per capita income. Prior research has greatly weakened the notion that health is the main driver of economic growth (Acemoglu & Simon, 2006). A study revealed that the increase in expenses between 1990 and 2011 was mostly caused by the aging population, accounting for two-thirds of the total. The remaining one-third was attributed to excessive cost growth (Neofytidou & Fountas, 2020). This study proposes two hypotheses, (H<sub>2</sub>) and (H<sub>3</sub>) of the study as below:

**H<sub>2</sub>:** *There is a significant relationship between Life expectancy and economic growth.*

**H<sub>3</sub>:** *Life expectancy significantly moderates the relationship between Government health expenditure and Economic growth.*

This study also includes three control variables, namely trade, inflation and unemployment. Trade is an important element of the economic growth of a nation. Past studies argued that elements related to commerce, investment, education, and population have a significant influence on economic growth in the long term relative to other factors (Stephan & John, 2020). A nation's GDP experiences growth as its level of trade openness expands. This is because increased trade openness enhances the country's integration with the global economy (Kinfaek & Bonga-Bonga, 2023). Furthermore, trade openness has a positive impact on economic development, depending on baseline income per capita and other factors (Makun, 2017).

Meanwhile, a gradual increase in the average price level of goods and services in an economy leads to a decrease in the purchasing power of a currency. Studies have shown a direct association between inflation and economic growth. There is evidence of a negative effect of inflation on GDP growth (Tien, 2021). Furthermore, inflation is more responsive to changes in growth rates compared to how growth is affected by fluctuations in inflation rates (Maliik & Anis, 2001). Conversely, unstable or excessive inflation can lead to reduced purchasing power, unpredictability, and changes in consumer behavior, all of which can affect the overall level of consumption in an economy. Inflation has a crucial role in determining economic growth, and it has been emphasized that higher levels of inflation will lead to reduced levels of investment (Barro, 1995).

GDP is a crucial measure of an economy's magnitude and well-being, strongly impacted by employment level. The relationship between employment and economic growth is intricate, and fluctuations in employment can have a direct or indirect impact on economic growth. A study discovered that there has been a decrease in the mobility of jobs and economic growth (Ying et al., 2021). High levels of unemployment can lead to inefficient use of resources and can affect government spending on healthcare and economic growth (Farsio & Quade, 2003). Overall, this study examines how government healthcare expenditure might contribute to a reduction in unemployment and promote increased consumer spending.

### 3. Research Methodology

#### Data

This study utilizes the dataset from the year 2000 to 2021 of 38 members of the Organization for Economic Co-operation and Development (OECD) countries. These countries are; Austria, Australia, Belgium, Canada, Chile, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Republic of Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States of America. The sources of data are from reputable databases; the World Bank Data for economic growth, government health expenditure, inflation, trade, and unemployment, and the OECD Health Statistic for life expectancy data.

#### Measurement of variables

Table 1 presents the measurement of variables used in the study.

**Table 1: Measurement of variables**

Variables	Definition	Measurement of variables
Economic Growth	The economic growth rate is a measure of the increase in a country's economic output over a specified period, typically expressed as a percentage. It represents the rate at which a nation's Gross Domestic Product (GDP) grows, adjusted for inflation, indicating the overall health and expansion of an economy.	Percentage change in Gross Domestic Product (GDP) over a specific period (usually quarterly or annually), adjusted for inflation. Unit: Percentage (%) Source: World Bank.
Government Health Expenditure (Current health expenditure % of GDP)	Government Health Expenditure refers to the total amount of money that a government allocates and spends on healthcare services, infrastructure, and initiatives for its population.	Total public spending on health services, preventive care, infrastructure, and research as a percentage of Gross Domestic Product (GDP). Unit: Percentage of GDP (%) Source: OECD Health Statistic, World Bank.
Life Expectancy at birth, total (years)	Life expectancy at birth is a statistical measure that estimates the average number of years a newborn is expected to live, assuming that the mortality rates at the time of their birth remain constant throughout their lifetime.	The average number of years a newborn is expected to live, assuming current mortality rates remain constant. Unit: Years Source: OECD Health Statistic, World Bank.
Trade (% GDP)	Trade (% of GDP) is a measure that indicates the relative importance of international trade (both exports and imports) in the economy of a country. It is calculated as the sum of a nation's exports and imports of goods and services, divided by its Gross Domestic Product (GDP), and expressed as a percentage.	The sum of exports and imports of goods and services as a percentage of Gross Domestic Product (GDP). Unit: Percentage of GDP (%) Source: World Bank.

Inflation : (Consumer Prices Annual %)	Inflation (Consumer Price Annual) refers to the percentage change in the average price level of a basket of goods and services typically purchased by households over a year. This measure tracks how much the cost of living increases (or decreases) from one year to the next. It is usually calculated based on the Consumer Price Index (CPI), which monitors the prices of items such as food, housing, transportation, healthcare, and other everyday expenses.	Annual percentage change in the Consumer Price Index (CPI), which tracks the prices of a typical basket of goods and services. Unit: Percentage (%) Source: World Bank.
Unemployment rate (ILO)	The Unemployment Rate (ILO) refers to the percentage of the labor force that is unemployed and actively seeking work, as defined by the International Labour Organization (ILO). This measure is a widely used indicator of the labor market's health and reflects the proportion of people who are not employed but are available and willing to work.	Percentage of the total labor force that is unemployed but actively seeking employment, as per the International Labour Organization (ILO) definition. Unit: Percentage of the labor force (%) Source: World Bank.

Economic growth is measured by the growth rate of the GDP. The term "gross domestic product" (GDP) refers to a metric that measures the annual percentage increase in the value of all goods and services that are produced inside a country. Gross Domestic Product (GDP) is calculated by aggregating the overall monetary worth of all goods and services generated inside a nation during a defined timeframe, usually a year or a quarter. The GDP growth rate is calculated by comparing the GDP of the current period to that of a prior period and expressing the change as a percentage, which indicates the extent to which the economy has expanded or contracted over time.

The Government healthcare expenditure (GHE) is a measurement that determines the proportion of a nation's gross domestic product that is allocated to healthcare expenditures (Al Shahrani & Al Sadiq, 2014). It demonstrates the government's expenditure on healthcare and the allocation of resources to sustain and enhance public health. In terms of measurement, the GHE is expressed as a percentage of the GDP.

Life expectancy (LE) refers to the average number of years that an individual is anticipated to live, taking into consideration the rates of mortality that are now in effect (Bloom, 2000). Life expectancy is determined by computing the mean number of years an individual is projected to live, taking into account the present mortality rates. This computation takes into account the mortality rates particular to different age groups within a community, usually by analyzing data from birth and death records within a defined timeframe. The metric for life expectancy is measured in years. The data was obtained from OECD health statistics and the World Bank.

Trade is the level of a nation's participation in international trade, which takes into account both the importing and exportation of goods and services at the national level. This entails calculating the total monetary worth of all goods and services sold to foreign nations (exports) and purchased from foreign nations (imports). Trade is quantified by computing the total value of exports and imports as a fraction of the GDP (Frankel & David, 1999). In addition, inflation is a decrease in one's ability to purchase goods and services is the outcome of inflation, which is a measurement of the rate at which the average prices of products and services increase over some time (Barro, 1995). Typically, this is accomplished by employing an indicator represented by the Consumer Price Index (CPI) that calculates the average fluctuation in prices that consumers pay. Quantifying inflation as a percentage effectively illustrates the extent to which prices have risen or fallen in a previous timeframe. This serves as a reliable measure of the overall expenses associated with daily life and the ability to buy goods and services during a certain period. Finally, this study defines unemployment as the percentage of the labor force that is now without a job but is actively looking for work. It is quantified by determining the proportion of individuals in the workforce who are actively searching for employment but are unable to secure a job. The unemployment rate is calculated by first dividing the total number of people in the labor force by the number

of people who are currently without jobs, and then multiplying the resulting figure by 100 (Farsio & Quade, 2003). The dataset is obtained from the World Bank database.

### Empirical model

Equation (1) presents the model used in the study.

$$y_{it} = \alpha + \beta X_{it} + \theta(g*l)_{it} + \gamma Z_{it} + \varepsilon_{it} \quad (1)$$

Where  $y_{it}$  is economic growth for the country  $I$  at time  $t$ .  $\alpha$  is the intercept,  $\beta X_{it}$  represents the independent variable of interest, namely; government health expenditure ( $g$ ) and life expectancy ( $l$ ). In addition, the study also aims to gauge the interaction effect of the relationship between government health expenditure and economic growth,  $\theta(g*l)_{it}$  represents an interaction variable of interest (government health expenditure times and life expectancy, as a moderator).  $\gamma Z_{it}$  represents other control variables (inflation, unemployment, trade). Finally,  $\varepsilon_{it}$  is the error term.

## 4. Results and Discussion

### Descriptive Analysis

Table 2 shows the descriptive analysis for all variables used in the study. The variables are Economic growth (EG), Government health expenditure (GHE), Life expectancy (LE), Inflation (I), Unemployment (UE), and Trade (T). GL is the interaction term of GHE and LE.

**Table 2: Descriptive statistics**

Variables	Observations (N)	Mean	Standard Deviation	Minimum	Maximum
EG	836	2.4614	3.5006	-14.8386	24.4753
GHE	836	8.3867	2.1936	3.8976	18.8158
LE	836	78.9987	3.1532	70.133	84.56
GL	836	666.234	186.615	295.8654	1400
GHE_C	836	0.0000	2.1936	-4.4891	10.4291
LE_C	836	0.0000	3.1532	-8.8657	5.5613
GL_C	836	3.6941	6.371	-23.9536	31.5181
I	836	2.7919	3.9232	-4.4781	54.9154
UE	836	7.5728	4.0422	1.81	27.47
T	836	93.4309	55.0098	19.5596	393.1412

The descriptive analysis of the variables offers valuable insights into the economic growth and government expenditure on healthcare across the sample countries. Economic growth (EG) has a mean value of 2.46% and a standard deviation of 3.50% which reflects considerable variability in economic growth across countries. This also suggests that the OECD countries are at various stages of economic development, which could be attributed to factors such as differences in health policies, economic structure, and external economic conditions. Government Health Expenditure (GHE) shows a mean of 8.39%, indicating that, on average, the countries allocate a moderate proportion of their GDP to healthcare. The standard deviation of 2.19% demonstrates a moderate degree of variability in GHE across the sample. This variation in GHE also highlights differing national priorities and fiscal capacities across countries, which could have significant implications for health outcomes and their impact on economic performance. Life Expectancy (LE) has a mean of 79 years, indicating that most countries in the sample have relatively high life expectancy, which correlates with good healthcare systems and better public health policies. The standard deviation of 3.15 years suggests relatively small variations in life expectancy across countries.

Inflation (I) has a mean of 2.79%, indicating that inflation rates were generally moderate across the sample countries. However, the standard deviation of 3.92% reveals substantial variability in inflation rates, which reflects the different macroeconomic conditions across the sample countries and the varying effectiveness of their monetary policies. The unemployment rate (UE) has a mean of 7.57%, indicating moderate unemployment levels across the sample. The standard deviation of 4.04% shows noticeable differences in unemployment rates among the countries. Lastly, trade (T) has a mean of 93.43% which indicates that trade plays a significant role in the economies of most OECD countries. The standard deviation of 55.01% suggests a wide range of trade openness, with some countries being highly integrated into the global economy and others being relatively more closed to international trade. In summary, these findings establish a basis for comprehending the intricate relationship between economic growth, health expenditures, and demographic considerations.

**Table 3: Correlation coefficients**

Variables	EG	GHE	LE	I	UE	T
<b>EG</b>	1.0000					
<b>GHE</b>	-0.3047	1.0000				
<b>LE</b>	-0.2277	0.5347	1.0000			
<b>I</b>	0.1396	-0.3210	-0.3964	1.0000		
<b>UE</b>	-0.0859	-0.1572	-0.2297	0.0204	1.0000	
<b>T</b>	0.1171	-0.2558	-0.0501	-0.0882	-0.0811	1.0000

The correlation analysis shows that economic growth (EG) has a weak negative correlation with both government health expenditure (GHE) and life expectancy (LE), indicating that higher GHE and LE are slightly associated with lower economic growth. GHE and LE, however, have a moderate positive correlation, suggesting that greater health spending is linked to longer life expectancy. Inflation has a weak positive correlation with EG but is negatively related to both GHE and LE, while unemployment shows weak negative correlations with EG, GHE, and LE. Trade openness has a weak positive correlation with GDP and a weak negative correlation with GHE and LE, suggesting minor relationships between trade and these variables.

The study first examines the effects of the set of explanatory variables on economic growth using the static panel data model. Log transformation is done on all variables to ensure more stable and normally distributed data. The results of the BPLM Test and Hausman Test indicate that the Fixed Effects model is the most appropriate. Table 4 reports the Fixed Effects regression results with robust standard errors following Driscoll and Kraay (1998). Robust standard errors are estimated due to the presence of heteroscedasticity, serial correlation and cross-sectional dependency as reported in Table 5.

**Table 4: Regression results**

Explanatory Variables	Dependent Variable: LEG			
	Pooled OLS	FE	RE	FE*
<b>LGHE</b>	-0.8450*** (0.1353)	-0.1074 (0.3019)	-0.6275*** (0.2022)	-0.1074 (0.6888)
<b>LLE</b>	-2.8470*** (0.9209)	-8.7731*** (2.1131)	-4.4087*** (1.3011)	-8.7731*** (2.7218)
<b>LI</b>	0.0155 (0.0344)	-0.0686 (0.0383)	-0.0214 (0.0360)	-0.0686 (0.0701)
<b>LUE</b>	-0.0912 (0.0636)	-0.3565*** (0.0918)	-0.2121*** (.0777)	-0.3565** (0.1436)
<b>LT</b>	0.0400 (0.0577)	0.6721* (0.2602)	0.1302 (.0940)	0.6721* (0.3546)
<b>Constant</b>	15.1760*** (3.9501)	37.2924*** (8.3370)	21.3964*** (5.4618)	37.2924*** (11.9284)
<b>BPLM Test</b>			56.29***	

<b>(P-Value)</b>	(0.0000)			
<b>Hausman Test</b>	18.21***			
<b>(P-Value)</b>	(0.0027)			
<b>F-Statistics</b>	25.40***	7.80***	10.04***	
<b>(P-Value)</b>	(0.0000)	(0.0000)	(0.0001)	
<b>Wald Statistics</b>				58.32***
<b>(P-Value)</b>				(0.0000)
<b>Obs. (N)</b>	669	669	669	669
<b>R-Squared</b>	0.1608	0.0587	0.1483	0.0587

Note: \*\*\*, \*\* and \* indicates statistical significance at 1%, 5% and 10% respectively. FE\* model is a Fixed Effect estimation with Driscoll and Kraay's (1998) robust standard error.

**Table 5: Diagnostic tests**

	<b>Modified Wald Test for Heteroscedasticity</b>	<b>Woodridge Test for Autocorrelation</b>	<b>Pesaran's Test for Cross-Sectional Dependency</b>
<b>Chi2 Statistics</b>	985.39***		
<b>(Probability &gt; Chi2)</b>	(0.0000)		
<b>F-Statistics</b>		67.976***	
<b>(Probability &gt; F)</b>		(0.0000)	
<b>C-D Statistics</b>			30.752***
<b>(Probability)</b>			(0.0000)

In examining the factors that influence economic growth, several key relationships have been identified through static models as in Table 4. A higher life expectancy and lower unemployment rates are both associated with lower economic growth, while higher trade is linked to higher economic growth. However, government health expenditure and inflation do not show statistically significant impacts on economic growth. The negative relationship between life expectancy and economic growth may seem unexpected, but in some cases, countries with higher life expectancy may face an aging population, which could result in a shrinking workforce, reduced productivity, and increased spending on pensions and healthcare, ultimately slowing economic growth. This finding is supported by the study of Sirag, Nor, and Law (2020) who found that the benefits of higher life expectancy may be offset by the economic burdens associated with an aging population, such as increased healthcare costs and a shrinking workforce. Other studies done by Bunyaminu et al.(2022) as well as Dauda (2011) also showed similar findings.

This study also found that higher unemployment rates are strongly associated with lower economic growth. This aligns with Okun's Law, which posits an inverse relationship between unemployment and economic output. Higher unemployment implies the underutilization of labor resources, which reduces output, productivity, and consumer spending, leading to slower economic growth. Our finding is supported by various studies such as Suyanto (2023), and Amar et al. (2022) which highlight the detrimental consequences of high unemployment on economic growth. This relationship is critical for policymakers aiming to stimulate economic growth through job creation and labor market interventions.

On the other hand, the positive relationship of economic growth with trade highlights the importance of global integration for economic performance. Countries more open to trade benefit from access to larger markets, increased competition, and the transfer of technology and knowledge, all of which can boost economic growth. Kinfaek and Bonga-Bonga (2023) further reinforce our finding by providing evidence of a significant positive relationship between trade openness and economic growth in African countries. Moreover, Makun (2017) emphasizes that trade openness not only increases productivity but also fosters research and development (R&D) activities, which are crucial for long-term economic growth.

However, government health expenditure does not have a significant impact on economic growth in this sample. This could suggest that the short-term economic benefits of health spending are not immediately



visible in economic growth figures. Furthermore, other factors such as efficiency in health spending or healthcare system quality could play a more crucial role in translating health expenditure into economic benefits. Our findings are supported by various empirical analyses such as Alam, Singh & Singh (2022), Islam, Modal & Haithman (2023) further reinforcing the idea that health spending may not always translate into economic growth. While the coefficient of inflation is negative as expected, it is also found to be insignificant. This is in line with the finding of Azam & Khan (2022) who reported that the overall impact of inflation on growth was not statistically significant, suggesting that other macroeconomic variables may play a more critical role in influencing economic growth.

Next, the study also examines the effects of government expenditure on health and life expectancy on economic growth using the dynamic panel data model. Similarly, log transformation is done on all variables. Table 6 reports the results of the Two-Step First Difference GMM and Two-Step System GMM, which are consistent in terms of the coefficient signs and significance levels, thus reinforcing the robustness of the findings. Nonetheless, the System GMM estimator typically provides more efficient results compared to First Difference GMM because it combines both level and differenced equations, thus allowing for a more robust estimation of parameters. Thus, this study mainly discusses the results of the System GMM.

**Table 6: Regression result**

Explanatory Variables	Dependent Variable: LEG	
	Two-Step First Difference GMM	Two-Step System GMM
<b>Lag LEG</b>	0.5233*** (0.1292)	0.4290*** (0.0890)
<b>LGHE</b>	-4.7727*** (1.2570)	-4.5212*** (1.1049)
<b>LLE</b>	20.4610 (18.2155)	9.0588 (11.3456)
<b>LI</b>	-0.2130** (0.0886)	-0.1955** (0.0861)
<b>LUE</b>	-0.0300 (0.3429)	-0.1984 (0.2828)
<b>LT</b>	-0.3878 (0.8149)	-0.0389 (0.6526)
<b>Constant</b>		-29.0200 (46.9152)
<b>AR(1)</b>	-3.38*** (0.001)	-3.82*** (0.000)
<b>AR(2)</b>	-1.79 (0.073)	-1.95 (0.052)
<b>Sargan Test</b>	0.88 (0.349)	1.98 (0.371)
<b>Hansen Test</b>	1.09 (0.295)	2.10 (0.350)
<b>Difference-in-Hansen Test</b>		1.18 (0.277)

Note: \*\*\*, \*\* and \* indicates statistical significance at 1%, 5% and 10% respectively. Both GMM models are estimated with robust standard error.

The Two-Step System GMM results highlight key dynamics in the relationship between variable of interest, government health expenditure and life expectancy on economic growth (EG). The persistence in economic growth, as indicated by the significance of lagged LEG, shows that past growth influences current economic performance. This is a common feature in dynamic models, as past economic conditions typically create a push for future growth. Liu (2019) reported a similar finding that historical growth rates play a crucial role in determining current economic performance, aligning with the idea of persistence in economic growth.

The coefficient for GHE is unexpectedly negative but significant at a 1% level. This negative relationship may seem counterintuitive but could be explained by the short-term nature of the data. High health expenditure might not lead to immediate productivity gains, and it can divert resources from other productive sectors in the short term. This finding is consistent with Alam, Singh, and Singh (2022) who found that government expenditures on healthcare have a long-run negative effect on GDP growth in Saudi Arabia. This is corroborated by the work of Faruk, et al. (2022) which identifies that health spending does not lead to increased economic growth, particularly in regions with poor institutional quality.

The coefficient for inflation is negative and is significant at the 5% level. This negative relationship aligns with traditional economic theory, where high inflation increases uncertainty, reduces purchasing power, and leads to less investment and consumption, ultimately slowing economic growth. Our finding is consistent with Živkov, Kovačević, and Papić-Blagojević (2020) who reported that inflation uncertainty has a significant negative spillover effect on economic growth, suggesting that higher inflation can hinder economic performance. Furthermore, Azam and Khan (2020) found that inflation negatively impacts economic growth, particularly when inflation rates exceed certain thresholds, reinforcing the idea that high inflation is detrimental to economic performance.

Life expectancy is not statistically significant, suggesting that there is no clear relationship between life expectancy and economic growth in this model. While higher life expectancy might generally be expected to boost growth in the long run, its immediate impact on economic growth might be negligible, especially if other mediating factors such as aging populations or healthcare costs offset the potential benefits of longevity. While the coefficient for unemployment is negative as expected, it is not significant. This could be due to a variety of factors, including variations in labor market policies or the structure of unemployment across countries. It may also indicate that other factors, such as labor market flexibility or social protection systems, mitigate the expected negative impact of unemployment on growth. Lastly, trade is also not statistically significant, indicating no clear relationship between trade openness and GDP in this model. This lack of significance may stem from different trade dynamics in the countries studied, such as the nature of traded goods or services and their relative importance to the domestic economy. Additionally, trade effects may take time to materialize or depend on complementary factors like infrastructure or innovation.

In terms of instrument validity, the Arellano-Bond Tests indicate that there is a first-order serial correlation but no second-order serial correlation in the residuals, implying that the model's instruments are appropriate and that the error terms are correctly specified. Furthermore, both the Sargan test and the Hansen test are not significant, which indicates that the instruments used in the model are valid and the model does not suffer from overfitting or endogeneity issues. Lastly, the Difference-in-Hansen Test is not significant, confirming that the additional instruments used in the System GMM are valid when compared to the First Difference GMM. This supports the use of the System GMM approach and strengthens confidence in the results.

**Table 7: Regression result with interaction terms**

	Dependent Variable: LEG			
	FD GMM Lag(1 2)	SYS GMM Lag(1 2)	FD GMM Lag(1 3)	SYS GMM Lag(1 3)
<b>L.leg</b>	0.511*** (0.126)	0.393*** (0.0845)	0.452** (0.142)	0.449*** (0.0839)
<b>ghe_c</b>	-0.598*** (0.171)	-0.601*** (0.157)	-0.678*** (0.184)	-0.680*** (0.182)
<b>le_c</b>	0.302 (0.212)	0.141 (0.144)	0.207 (0.211)	0.205 (0.178)
<b>gl_c</b>	0.0487 (0.0437)	0.0289 (0.0394)	0.0656 (0.0533)	0.0645 (0.0429)
<b>li</b>	-0.213* (0.0885)	-0.190* (0.0859)	-0.179 (0.105)	-0.178 (0.102)
<b>Lue</b>	-0.0305 (0.332)	-0.212 (0.285)	-0.0560 (0.357)	-0.0584 (0.312)
<b>lt</b>	-0.363	-0.0225	0.162	0.163

<b>_cons</b>	(0.830)	(0.662)	(0.804)	(0.826)
		0.972		-0.403
		(3.115)		(3.709)
<b>Obs (N)</b>	459	554	459	554
<b>AR(1)</b>	-3.45***	-3.76***	-3.03***	-3.92***
	(0.001)	(0.000)	(0.002)	(0.000)
<b>AR(2)</b>	-1.82	-2.06**	-1.89	-3.92
	(0.069)	(0.040)	(0.059)	(0.063)
<b>Sargan Test</b>	0.82	2.64	5.99	6.10
	(0.366)	(0.267)	(0.050)	(0.107)
<b>Hansen Test</b>	1.01	2.44	6.50**	6.58
	(0.316)	(0.295)	(0.039)	(0.087)
<b>Diff in Hansen Test</b>		1.12		6.58**
		(0.290)		(0.037)

The relationship between government expenditure on health and economic growth is a topic of great interest and importance in understanding the dynamics of a country's economy. In this analysis, this study focuses on the impact of lagged economic growth and government health expenditure on economic growth. While some variables show significant relationships with economic growth, others, such as life expectancy, unemployment, and trade, do not exhibit clear correlations in this model. These results indicate that government health expenditure has a significant impact on economic growth, while the effects of Life expectancy are not statistically significant in this model. The lagged economic growth has a positive and significant impact on the current economic growth, indicating persistence in economic growth over time.

In terms of the interaction model, the results of the dynamic panel regressions using First Difference GMM (FD GMM) and System GMM (SYS GMM), with different lag structures, are presented in Table 7. Across all specifications, lagged economic growth is significant, which indicates that economic growth in the previous period positively influences current economic growth, suggesting persistence in economic growth. The coefficient for GHE is negative and significant at the 1% level across all specifications. This suggests that increases in government health expenditure are associated with a decrease in economic growth. A negative relationship might reflect the short-term impact of reallocating resources to healthcare, which could crowd out investment in other productive sectors. It could also indicate inefficiencies in health spending that do not translate into immediate economic gains.

LE is not statistically significant in any of the models, indicating that there is no clear evidence of a direct relationship between life expectancy and economic growth. This may suggest that the impact of life expectancy on growth is indirect or manifests over the long term, as countries with high life expectancy may also face challenges like aging populations, which can offset potential economic benefits. The coefficient for the interaction term (GL) is positive but not statistically significant in any of the models. This suggests that life expectancy does not have a moderating effect on the relationship between government health expenditure and economic growth in this model. The lack of significance could mean that, in the short run, the relationship between health expenditure and life expectancy does not have a strong, combined impact on economic performance.

The coefficient for inflation is negative and significant at the 10% level in the FD GMM Lag(1 2) and SYS GMM Lag(1 2) models. This aligns with the theory that higher inflation creates economic instability, reduces purchasing power, and discourages investment, thus negatively affecting growth. Unemployment and trade are not statistically significant in any of the models, suggesting no strong evidence of a direct relationship between unemployment and trade with GDP growth in this sample. Unemployment may be insignificant due to differences in labor market structures or policies that mitigate the negative effects of unemployment on economic performance. On the other hand, the insignificance of trade might stem from varying trade structures and external factors affecting the economic performance of the countries in the sample.

The results of the diagnostic tests are crucial for assessing the validity of the GMM models and ensuring that the results are reliable. The results generally support the validity of the GMM models, particularly in the Lag(1

2) specifications, which show no major issues with autocorrelation or instrument validity. However, caution should be taken with the Lag(1 3) specifications, especially for the FD GMM Lag(1 3) model, where the Hansen test indicates possible overfitting or instrument problems.

## 5. Conclusion

The objective of the study is to examine the influence of government health expenditure and life expectancy on economic growth in OECD nations between 2000 and 2021. The study uses both static and dynamic panel data models. The study also aims to determine whether life expectancy has a significant role in moderating the relationship between GHE and economic growth. The study's findings indicate that in the short term, GHE has a detrimental effect on economic growth, maybe because of the acute financial strain caused by healthcare expenses. The study emphasized the need for policies that effectively manage immediate financial expenses while also considering the long-term advantages of investing in healthcare. Additionally, the study found a negative relationship between life expectancy and economic growth, indicating that a greater life expectancy could result in escalated healthcare and pension expenses, thereby impeding economic growth in the long run. There is no meaningful moderating effect of life expectancy on the relationship between GHE and economic growth. This outcome emphasizes the intricacy of demographic issues and their diverse effects on economic growth in the sample study. In conclusion, the study highlighted the significance of differentiating between the immediate and long-term economic consequences when developing healthcare spending plans. It is recommended that policymakers take a long-term approach to healthcare spending, understanding that although the initial expenses may be substantial, the long-term advantages include enhanced public health and increased economic output.

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