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EMPIRICAL STUDY ON THE INTERACTIVE EFFECT OF HEALTH EXPENDITURE AND LABOR ON ECONOMIC PERFORMANCE IN THE UNITED STATES (1960 - 2022)

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ABSTRACT

This paper has investigated the effect of the interconnection between health expenditure and labor supply in relation to the economic performance in the United States. Descriptive research design was adopted, while annual time series secondary data for the period 1960-2022 were obtained from the World Development Indicators (WDIs, 2024). Short run and long run analyses were carried out using the Autoregressive distributed lag (ARDL), while a robustness check for the long run relationship was carried out using the Fully Modified Ordinary Least Squares (FMOLS). Findings from the study revealed that the interactive variable of health expenditure and labor has positive and significant impact on real output in manner that a percentage increase in the interactive variable will enhance economic performance by 0.51 percent ($t = 5.52$, $p < 0.01$) and 0.59 percent ($t = 3.35$, $p < 0.01$) increase economic performance in the short run and the long run, respectively. The same results were affirmed by the robustness check conducted using the FMOLS, where a percentage increase in the interactive health and labor variable will bring about 0.76 percent ($t = 11.79$, $p< 0.01$) increase in the US economic growth. However, labor supply was found to exert negative effects on economic performance when it is unaided by any growth enabling factor. Specifically, percentage increase in labor will reduce economic output by 0.76 percent ($t = -1.94$, $p < 0.10$) in the short run and by 1.68 percent ($t = -1.73$, $p < 0.10$) in the long run. This study found health expenditure-augmented labor more productive to economic growth. The study recommends that policy makers focus more on making strategic policies that will channel health spending towards enhancing labor productivity.

Keywords: Health Expenditure, Economic Growth, Interactive Variable, Economic Performance, Labor productivity.

1.0 INTRODUCTION

The debate on the rising health expenditure in the developed and the developing countries has once again spurred the interest of researchers in empirically establishing the current status of the nexus between health spending and economic performance. Whilst different economies pursue growth, full employment, stable prices, Balance of Payment, and the improved overall quality of life for their citizens, the role of workforce productivity cannot be undermined. The

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rising cases of global health challenges and the need to nip it in the bud before spiraling into severe economic consequences have necessitated increase in health spending by nations. In the United States in particular, health spending has increased dramatically in the last four decades, maintaining double- digit figures consistently and progressively. In 1960, the ratio of health spending to the GDP, in the United States, was 5 percent. It maintained its steady, one-digit progressive increase until 1983, when the ratio slid into double-digits, representing 10 percent of the US GDP. The rising trend of health spending as a ratio of GDP reached an all-time high with a remarkable percentage value of 19.5, which represents $4.157 trillion in absolute terms.

In spite of increasing health expenditure in the United States, the performance of the economy has been remarkable year in, year out. The labor force participation rate has also progressively increased since 1960. For instance, since 2014, over 200 million Americans have continuously taken active part in labor supply both in the private and public subsectors. As of 2022, there were about 207 million people in the national workforce, representing 62.24 percent of the entire population. The US GDP has consistently and sustainably led the world economies with a total value of $25.7 trillion in 2022. Although the GDP declined slightly in 2020 for reasons connected to the COVID-19 pandemic, it bounced back with a whopping $23.6 trillion in 2022. Meanwhile, as much as, the growth in the US GDP can be explained by many factors, it is not coincidental that the rate of labor force participation and health expenditure had equally maintained a similar trend. This scenario supports the hypothesized positive relation between health spending on economic performance.

The increasing spate of health expenditure in the United States between 2018 and 2022, representing an average of 17.98 percent of the US GDP is significant. Consequently, economists and policy makers have continually debated the implications of such spending on the economy of the United States, while concerns have ranged from its impact on national productivity, to the overall economic performance and to the maintainability of such spate of spending. The theoretical and empirical expositions on the role of health expenditure on economic growth have been enormously discussed in the literature (Barro, 1996; Bukenya, 2009; Mehrara et al, 2011; Sahnoun, 2018; Raghupathi et al, 2020; Xu et al, 2022). Although, the health expenditure and growth nexus has been debated by studies across countries at both cross-country and country-specific levels, there is yet no conclusion on the precise impact of health expenditure on economic performance. Regardless of the inconclusiveness of the relation between the two variables, a non-negative relationship is expected.

The direct and indirect relationships between health spending and economic performance have been examined (Kurt, 2015; Erçelik, 2018; Esen et al, 2021; Beylik et al, 2022; Penghui et al, 2022). These studies have identified labor supply as the transmission channel by which health expenditure relates to economic performance. However, these studies have only included health expenditure as an independent variable in explaining economic performance. This will create problem for policy makers as the direct impact of health expenditure on economic growth can only be measured without recognizing its interaction with labor supply. This paper fills the gap by investigating the interactive effects of health expenditure and labor supply on economic performance in the United States.

2.0 LITERATURE REVIEW

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2.1 Theoretical Reviews on Health Expenditure and Economic Growth

Many theories have attempted to explain the relation between health expenditure and economic growth. Although, there is no direct theory for this purpose, relevant theories have been adapted by scholars to investigate the empirical relation in order to affirm or refute the hypothesized theory.

Some of the relevant theories examined in this paper are: the neoclassical theory, the endogenous theory, and human capital theory.

2.1.1 Neoclassical Theory on Health Expenditure and Economic Performance

Economists of the classical and neoclassical schools of thought have identified a strong linear, and positive relationship between labor and economic output. The theorists assert that for production of goods and services to take place, a proportion of labor must combine with capital assets, and both enabled by the existing technology to transform inputs into output. In relation to health expenditure however, several studies have examined the direct role of health expenditure on economic performance using various econometric techniques. However, the approach may be faulted on technical grounds as health expenditure is a not direct input factor in the production process. Expectedly, health expenditure can enter the production function either by augmenting labor supply, or providing workplace safety in the event of accident or work-related hazards.

In the context of this paper, health expenditure is perceived as labor-augment component, which can enhance both the productivity of labor and the overall economic output. The neoclassical theory is limited in many respects that it fails to consider beyond capital and labor as factors making production possible.

2.1.2 Endogenous Growth Theory on Health Expenditure and Economic Performance

This theory realigns focus from the external factors to the internal strengths of an organization in explaining growth. Developed in 80's by Romer and Lucas, the theory asserts a positive relation between knowledge, innovation, returns to scale, as well as institutions and policies and the performance of an organization. As such, human capital development, improved productivity of labor, innovation, research and development, as well as increased life expectancy are the links between health expenditure and output productivity. The theory is limited in certain ways, which include: measurement problem, its inability to dissociate the effect of poor health system on health expenditure's relationship with economic growth, and other context-specific issues, among others.

2.1.3 Human Capital Theory on Health Expenditure and Economic Performance

Developed by Becker, Schultz, and Mincer, human capital theory identifies strategic investment in workers' training, education, and health as having positive impacts on their performance and productivity. In other words, the human capital theory believes that by investing qualitatively and quantitatively in human capital through capacity building and health management, the workers' productivity can be assured and their contributions to overall economic growth is almost a certainty. In essence, the human capital theory provides a useful

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guide in understanding the nexus of health expenditure with economic growth. The theory is, however, limited by measurement problem, and myriads of external factors.

2.2 Empirical Review

Many empirical studies have investigated the relationship between health expenditure and economic performance; the results have both been enormous and thought-provoking. Available evidences show that these studies have been conducted on a country-specific and cross-country bases. They have equally focused on developed countries, emerging economies, and the underdeveloped countries. Whilst there is no consensus on the outcomes obtained, the need for further investigation of the relationship in the light of new data set and different period coverage, change of methodology, conducting studies with robustness checks cannot be overemphasized.

Some of the earliest studies on the nexus of health expenditure and economic growth established a strong connection between health-related spending and economic performance (Mushkin, 1962; Preston, 1975). Corroborating the findings of Muskin, and Preston, many studies on country- specific studies have established positive relation between health spending and economic performance. For instance, Bukenya (2009) investigated the nexus of health spending with economic output in the United States over 1980-2004. Using Vector Autoregression, the study concluded that of all health-related spending, personal health expenditure impacted economic growth the more. In a more recent study on the United States, Raghupathi et al (2020) applied Visual Analytics in understanding the relationship between health spending and the US economic performance. The outcome showed a strong positive correlation between the variables. This implies that the more health spending is made, the higher the economic performance.

A similar study was conducted on China by Zhang et al (2020), who adopted Spatial Durbin model and found that public health expenditure positively and significantly impacted economic growth in China. In a related study, Lopreite et al (2020) also adopted Bayesian VAR to investigate nexus of health expenditure, ageing population and economic performance in China. The study, unlike previous studies, found that economic growth is responsible for increasing health expenditure and life expectancy. The study further added that China ageing population is a cause for concern in China. Penghui et al (2022) further investigated the direct and indirect effect on health spending on the economy of China. Using spatial panel data, the study established that health variables positively enhance economic growth in China.

Further investigation of the health expenditure – economic growth nexus in developing economies have caught the attention of researchers. Mohsen et al (2011) conducted an autoregressive study on health spending and economic performance in Iran. Health spending had a much more positive impact on mortality rate than aiding the economic performance of Iran. A similar study on Iran was conducted by Safdari et al (2013), where the proportion of health spending to GDP was found to positively relate to the growth rate of Iran. The investigation of the nexus of health expenditure and growth was also extended Saudi Arabia, where Bagadeem et al (2020) adopted linear regression, Vector Autoregression, and Mediation method for analyzing the relationship. The study only established lagged significance between health spending and economic growth. Unlike the outcome of the studies on Iran and Saudi

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Arabia, a similar study conducted on Turkey produced mixed results. Kurt (2015) adopted Feder-Ram model to investigate the relation of public health spending with economic output in Turkey. While the direct effect of health spending improves economic performance, the indirect effect produced negative outcomes. Erçelik (2018) also investigated health-growth nexus on Turkey using the autoregressive distributed lag. A positive long run relationship was established between the variables. Innovatively, Esen et al (2021) investigated the direction of causation health and growth variables on Turkey using Granger causality technique. The results showed that health expenditure leads economic growth.

The relationship between health expenditure and economic performance in Africa has also been variously investigated. Ndaguba et al (2021) investigated the public health spending and growth relation in South Africa using ARDL. Positive relationship was established between the variables. A similar study was conducted in Nigeria by Ogundipe et al (2011). Using linear regression, health spending was found to have positive but an insignificant impact on economic performance in Nigeria. Conversely, another study by Ojo et al (2022) on Nigeria, using error correction model, found a positive impact of health spending on growth. Furthermore, Olayiwola et al (2021) conducted causational study on Nigeria using Granger causality test. The study found no causal relationship between public health spending and economic output in Nigeria.

Cross-country studies on health spending and economic output have also produced mixed results in different regions of the world. Some cross-country studies have established a positive relation between health expenditure and the performance of the economies of the concerned countries. Studies in this light are: Bedir (2016), Piabuo et al (2017), Beylik et al (2022), Qehaja et al (2022), and Aboubacar & Xu (2017). However, some studies demonstrated mixed results for the short run and the long run. For instance, Ozturk et al (2014) conducted a panel study on health-growth nexus on G8 countries. The study revealed a positive short run outcomes for the countries in the short run, while a negative long run outcome was also obtained.

While all the studies have provided mixed outcomes on the health-growth relation, none of the studies examined the interactive effect of health expenditure and the channel by which it enters the production function, which is the labor. Regressing health expenditure directly on economic output may be misleading. This is because it may be difficult for policy maker to gauge the effect health expenditure on different factors of production. This study has allayed this challenge, by pinning health expenditure down to labor supply, and their joint interactive effect on economic performance in the United States has been examined in this study.

3.0 METHODOLOGY

In order to examine the interactive effect of health expenditure and labor supply on economic output in the United States, time series data over the period of 1960 – 2022 have been collected. The research design is descriptive research design, while data on GDP, Gross Fixed Capital Formation (GFCF), Labor (LFT), National Health Expenditure. The interactive variable of Health and Labor was obtained using Khot (2020) approach. All the data were obtained from the World Development Indicators (WDI, 2022).

3.1 Model Specification

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Since the relationship between inputs and output is better described by the Neoclassical Cobb-Douglas production function. The model was used to examine the relationship between health expenditure as an input factor and labor augmenting factor alongside capital stock in explaining economic growth in the United States. The Cobb-Douglas production is stated as:

$Y_t = fA(K_t, L_t)(1)$

Where: Yt is the total economic output at time t; K_t is the stock of capital employed in production; L_t is the total labor supply, A is the technological progress.

In relation to health expenditure, the model (1) will be augmented with health expenditure and the interactive variable of health expenditure and labor. The new model is presented, thus:

$Yt = fA(K_t, L_t, HE_t, HEX * L_t)$ (2)

In order remove any possible outlier, and provide relatable data set that provides ease of interpretation, all the variables were transformed into their log-linearized forms. The assumed linear relationship which exist between national output and health expenditure variable among the others is specified thus:

$lnY_t = \beta o + \beta_1 lnK_t + \beta_2 lnL_t + \beta_3 lnHE_t + \beta_4 \ln (HEX * L_t) + \varepsilon_t$ (3)

Where: lnY_t is the log of national economic output; $lnKt$ is the log of capital employed in production; $lnLt$ is the log of total labor force in the production of goods and serves that were captured in the GDP; $lnHE_t$ is the log of Health Expenditure; $lnHEX * L_t$ is the log of interactive Health Expenditure and Labor variable; εt is the idiosyncratic error term that is Independently and Identically distributed as: D $\mu_t \sim N(0, 1)$; αo is the intercept term, β_1, β_2, β_3 and β_4 are the unknown coefficients terms of the exogeneous variables.

The estimation technique adopted is the autoregressive distributed lag (ARDL), which is specified in the short run and the long run as:

$$\Delta lnGDPt = \alpha o + \sum_{i=0}^{q} \alpha 1 \Delta lnKt-i + \sum_{i=0}^{q} \alpha 2 \, \Delta lnLt-i + \sum_{i=0}^{q} \alpha 3 \Delta lnHEt-i + \sum_{i=0}^{q} \alpha 4 \Delta lnHEXLt-i$$

$$+ \delta 1 \Delta lnKt-i + \delta 2 \Delta lnLt-i + \delta 3 \Delta lnHEt-i + \delta 4 \Delta lnHEXLt-i + ECTt-1 + \mu t \quad (4)$$

In order to test the robustness of the long run results obtained by the ARDL, the study also conduct the long run relationship between the variables using Fully Modified Ordinary Least Squares (FMOLS). The FMOLS is advanced technique that is capable of autocorrecting for any perceived serial correlation between the variables. The FMOLS is specified thus:

$$lnGDPt = \varphi o + \varphi 1 lnKt + \varphi 2 lnLt + \varphi 3 lnHEt + \varphi 4 lnHEXLt + \sum_{i=0}^{q} \psi i \Delta lnKt-i + \sum_{i=0}^{q} \psi i \, \Delta lnLt-i$$

$$+\sum_{i=0}^{q} \psi i \Delta lnHEt-i+\sum_{i=0}^{q} \psi i \Delta lnHEXLt-i+ \emptyset' \boldsymbol{Di} + v1t \quad (5)$$

3.2 Data Sources and Measurement

Table 1 Measurement of Variables and Data Sources

Variable	Measurement	Sources
Economic Performance	GDP, value added (Constant 2015US$)	WDI, 2022
Capital stock	Gross Fixed Capital Formation (Constant 2015US$)	WDI, 2022
Labor	Labor force participation rate, total (% of total population ages 15+ (national estimate)	WDI, 2022
Health Expenditure	National Health Expenditure	WDI, 2022
Interactive Variable	A fusion of health expenditure and labor supply using Khot (2020) approach	Authors' estimation

Source: Authors' construct 2024

4.0 PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

4.1 Descriptive Statistics of the Data

The usual first step taken in empirical studies is to observe the nature and the statistical quality of the data obtained for the econometric analyses. In achieving this feat, the descriptive statistics of the variables, as generated has been presented in Table 2

Table 2 Descriptive Statistics

	RGDP	CAPITAL STOCK	LABOUR FORCE	NAT. HEALTH EXP
Mean	7,470,000,000,000.00	39,563,013.00	162,000,000.00	1,110,000,000,000.00
Median	5,800,000,000,000.00	37,711,616.00	165,000,000.00	682,000,000,000.00
Maximum	21,500,000,000,000.00	69,059,464.00	207,000,000.00	3,770,000,000,000.00
Minimum	542,000,000,000.00	14,693,055.00	107,000,000.00	27,100,000,000.00
Std. Dev.	6,330,000,000,000.00	16,923,244.00	32,734,298.00	1,140,000,000,000.00
Skewness	0.64	0.22	-0.2	0.86
Kurtosis	2.13	1.72	1.6	2.41
Jarque-Bera	5.95	4.57	5.3	8.2
Probability	0.05	0.1	0.07	0.02
Sum	4.48E+14	2.37E+09	9.74E+09	6.67E+13
Sum Sq. Dev.	2.36E+27	1.69E+16	6.32E+16	7.64E+25
Observations	60	60	60	60

Source: Authors' Construct, 2024

As shown in Table 2, the economic data maintained good statistical qualities and nature. For all the variables, the relationship between the mean, the median and standard deviation followed the expected threshold save for national health expenditure, whose standard deviation is higher than its mean value. This points to the likelihood of volatility in the management of health expenditure at the national level. The data set followed a normal distribution as shown by the Jarque-Bera, the skewness and kurtosis.

4.2 Test for Variables Stationarity

The test was considered using the Augmented Dickey-Fuller and Philips Perron tests. The results is as shown in Table 3. All the variables are integrated of order 1, i.e. I(1) in the ADF, while Philips Perron found only capital stock not stationary at first difference.

Table 3 Test for Stationarity

Unit Root Test with Constant & Trend

	Augmented Dickey-Fuller (ADF)			**Philips –Peron**		
Variables	**t-stat**	**Prob.**		**Adj. t-stat**	**Prob.**	
	At Level	**At First Diff**	**Remark**	**At Level**	**At First Diff**	**Remark**
LNGDP	-0.0189 (0.9952)	-5.4676 (0.0002)***	I(1)	-0.2992 (0.9890)	-5.4537 (0.0002)***	I(1)
LNCS	-0.1676 (0.9923)	-4.5389 (0.0031)***	I(1)	-0.0651 (0.9944)	-2.9264 (0.1621)	NS
LNLFP	0.5233 (0.9992)	-4.9382 (0.0009)***	I(1)	1.3998 (1.0000)	-4.9382 (0.0009)***	I(1)
LNNHEXP	-0.3910 (0.9858)	-3.5610 (0.0418)**	I(1)	0.6700 (0.9995)	-3.4469 (0.0546)*	I(1)

Note: ADF, PP, and *, **, and *** represent 1%, 5%, and 10% level of significance

Source: Authors' Computation using EViews 10, 2024

4.3 Cointegration Test

Prior to estimation of the short run and long run analyses, the long run equilibrium between the variables were estimated using the ARDL Bounds test.

Table 4. Bounds Test for Cointegration

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.7043***	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

*, **, and *** represent 10%, 5%, and 1% level of significance respectively

Source: Authors' Computation using EViews10, 2024

Long run equilibrium test shows the existence of long run convergence between the variables of interest.

4.4 Regression Results on the Interactive Effect of Health Expenditure and Labor on the Economic Performance in the United States

Table 5 presents the results of the short run and the long run relation between the explained and the explanatory variables using the Autoregressive distributed lag (ARDL).

Table 5 Short Run and Long Run ARDL Results

Variable	Coefficient	Std Error	t-Stat	Prob.
D(LNCS)	5.328915	0.442695	12.03743***	0.0000
D(LNLFP)	-0.755388	0.388577	-1.943983*	0.0588
D(LNNHEXLPF)	0.507463	0.091982	5.516977***	0.0000
D(LNNHEXLPF(-1))	0.162101	0.089267	1.815918*	0.0767
CointEq(-1)*	-0.172672	0.033984	-5.080989***	0.0000
LNCS	1.100281	0.516120	2.131834**	0.0391
LNLFP	-1.678749	0.966086	-1.737680*	0.0898
LNNHEXLPF	0.584594	0.174655	3.347129***	0.0018
C	14.86498	12.70475	1.170034	0.2487
R-Squared	0.92			
Adj. R-Squared	0.90			
Durbin Watson	1.47			

*, **, and *** represent 10%, 5%, and 1% level of significance; Note: R-Sqd is R-Squared

Source: Authors' Computation using Eviews10, 2024.

As shown in Table 5, capital stock has very strong, positive and significant impact on economic performance in the United States within the period under study. Specifically, 1 percentage increase in the stock of capital will increase the US national output by 5.32 percent ($t = 12.04$, $p < 0.01$). Surprisingly, labor force participation exerted negative effect on real national output. Although, a negative relation was observed between labor force and economic performance in the US, the relation is significantly weak at about 10 percent, raising hope that with proper policy in place, labor force participation will continue to contribute to the US economic growth. However, the interactive variable of health expenditure and labor force participation has very strong, positive, and significant relationship with economic performance in the US. The results revealed that 1 percentage increase the interactive variable will bring about 0.51 percent ($t = 5.52$, $p < 0.01$) increase in economic output. The error correction term ($ECTt-1$) aligns with its a priori expectation of negative and significant coefficient. This term measures the speed of adjustment in the disequilibrium, between the short run and the long run. At 17.2 percent ($t = -5.08$, $p < 0.01$), the disequilibrium between the short and the long run will be corrected annually at the rate of 17.2 percent.

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Furthermore, the long run relationship between the explanatory and the explained variables replicates the short run results. Both the capital stock and the interactive variables maintained their positive impacts on the economic performance in the US as reported under the short run results. In a similar manner, the labor force participation also maintained its negative effect. Interestingly, a slight increase awaits economic performance in the future on account of the interactive variable, such that 1 percentage increase in the interactive variable will increase real output in the US by 0.59 percent ($t = 3.35$, $p < 0.01$). Conversely, the results predicted a long run downward effect on economic growth in the US, where 1 percentage increase capital stock leads to 1.1 percent ($t = 2.13$, $p < 0.05$) increase in economic output.

The results have a sound goodness of fit measure with both the R-squared and the Adjusted R-squared having 92% and 90% values, respectively. Furthermore, the likelihood of serial correlation has been clearly dismissed by the Durbin Watson value of 1.47, which, if approximated, will be equal to 2, the threshold value.

In order to verify the robustness of the long run results obtained by the ARDL technique, the long run relationship between the real output in the United States and the explanatory variables was equally investigated by the use of Fully Modified OLS. Table 6 presents the results.

Table 6 FMOLS Long Run Results

Variable	Coefficient	Std Error	t-Stat	Prob.
LNCS	0.015232	0.151438	0.100581	0.9202
LNLFP	-0.944638	0.457136	-2.066425**	0.0435
LNNHEXLPF	0.762299	0.064678	11.78608***	0.0000
C	11.80509	6.103891	1.934027	0.0583
R-Sqd	0.99			
Adj. R-Sqd	0.99			

*, **, and *** represent 10%, 5%, and 1% level of significance; Note: R-Sqd is R-Squared

Source: Authors' Computation, 2024.

As depicted in Table 6, the results obtained by the FMOLS affirms the findings obtained by Autoregressive distributed lag. The results align with the earlier long run findings for capital stock, labor force participation, and the interactive variable. The only difference is that, while the stock of capital has long run positive relationship with economic growth in the US, the relationship is not statistically significant. Conversely, labor force maintains a significant, negative relationship with economic performance in the long run, such that: 1 percentage increase in labor supply, will bring about 0.94 percent ($t = -2.07$, $p < 0.05$) reduction in economic performance in the US. Results However, the interactive effect of health expenditure and labor force maintains the long run positive and significant impact on the US economic performance. Specifically, 1 percentage increase in the interactive health and labor variable will bring about 0.76 percent ($t = 11.79$, $p < 0.01$) increase in the US economic growth.

4.5 The Implications of the Findings and Suggestions for Further Study

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The variable of interest in this study if the interactive effect variable, which combines health expenditure with labor force participation. The joint effect of the interactive variable has shown a visible difference from the ordinary labor force in the production function. This has further reinforced the claim that labor is the channel by which health expenditure can make positive impacts on an economy. When the ordinary labor was regressed alongside other explanatory variables on economic output, the short run outcome is the same as the long run findings. Both are negative and significant in the instances. This means that the role of strategic and properly implemented health expenditure is capable of catalyzing economic growth in unprecedented ways. This is because the effect of the interactive variable was stronger in the short run than in the long run. Capital and labor are two critical input factors in production. That labor exerts negative effects on national output should be a critical concern to policy makers. The performance of labor is weak and counterproductive. This study has shown that with appropriate health policy, labor can be more productive in spurring economic growth. Other researchers may investigate other variables that can enhance the performance of labor in the production function. Such variables may include: education, workplace safety, and motivation.

4.6 Post-Estimation Diagnosis

The study also conducted the post-regression diagnoses for the purpose of ascertaining the extent to which the regression results are reliable and useful for future predictions and predictions. As such, the Autoregressive Conditional Heteroskedasticity (ARCH) test, and the Serial Correlation LM test by Breusch-Godfrey, among others were conducted.

Table 7. Post-regression estimation

ARCH Heteroskedasticity Test			
F-statistic	0.410037	Prob. F(1,53)	0.5247
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.333708	Prob. F(6,35)	0.2686

Source: Authors' Construct on Eviews 10, 2024

The results in Table 7 showed that there is no problem relating to serial correlation or increasing variance among the variables.

5.0 CONCLUSION

This study concludes that though labor is an important input in the production process, empirical findings have shown that labor productivity maybe counterproductive if not properly augmented by growth-enabling factors such as health expenditure. To maintain its global lead in economic output, the United States must take policies of health expending, health insurance and the overall healthcare delivery in the country seriously.

Author's Contributions

Oluwaseyi Hinmikaiye conceived the idea, downloaded relevant papers, conducted literature review, and prepared the manuscript. Omotolani Akinbolajo collated relevant data, and

prepared the pre-regression analyses. Olajumoke Akanbi conducted the econometric analyses, while Williams Adeyemi reviewed the manuscript and made useful recommendations. All the authors read and agreed on the manuscript before publication.

Conflict of Interest

There is no conflict of interest relating to the study.

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Data Availability

The study was conducted using free and open-sourced data as indicated in the article.

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