Acta Universitatis Danubius
ŒCONOMICA

Validating Connection Amid Public Expenditure on Education, Health and Economic Growth in South Africa

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Abstract: The study evaluates the connection amid public expenditure on education, health in relation with economic growth in South Africa. The data span across 1990-2020. The study employed VAR technique to analyse the data. The findings signify that domestic general government health expenditure had a negative influence on economic growth in the second period but a positive impact in the first and third periods. GEED has consistently had a favorable and substantial effect on economic expansion. Experience has a detrimental effect on the second period and a good one on the first and third. Imp has a comparable effect on economic growth to exports, contributing favorably to growth in the first and third periods and adversely to growth in the second. Essentially, national growth strategies need to be tailored to encourage expenditure on health and education for advancement of the economy.

Keywords: Public expenditure; Health; Education; Economic growth

1. Introduction

Diverse rates of economic growth have been observed in South Africa since the democratic transition period, which witnessed the removal of sanctions, the onset of free trade, and a rise in foreign direct investment (FDI). The nation's position as a pathway to the African continent was accelerated by the political cataclysm, which lengthened the financial services, retail, and manufacturing segments of the country, so diversifying it beyond the mining and agricultural industries. The nation's presence in international trade was further reinforced by a period of boom in commodities between 2004 and 2007 (Frankel et al., 2008). Nonetheless, South Africa's exports and employment fell significantly as a result of the worldwide financial distress of 2008–2009 (South African Reserve Bank 2009). The government of South Africa created the National Development Plan (NDP) as a

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national blueprint to lessen the impact of poverty, inequality, and unemployment on the economy. According to the National Planning Commission (2011), the NDP believes that investing in human capital is essential to lowering inequality and preparing people to engage in economic endeavors that generate wealth. A staff that is well-educated, proficient, and in good health is crucial to achieving increased levels of overall production.

The emancipation of people through expenditure on education and health is one of the primary factors that determines a nation's economic performance (Barro 1991). For this reason, public investments in human capital are likely the tool that states employ most frequently to accomplish economic growth in their countries. Public investments in human capital enable its inhabitants to experience a complete increase in human capital that fosters knowledge advancement. The level of living can be raised in this way (Blankenau et al., 2004).

One of the issues with conducting business in South Africa has been identified as an undereducated labour force (Mohapatra, 2017). This shortfall may be able to control capital inflows and foreign direct investment. In this sense, between 1980 and 2016, GDI as a % of GDP dropped from 27.9% to 18.9% (South African Reserve Bank 2018). According to Glomm (1992), the host economy's or country's capacity to absorb new technology determines how sophisticated technology flows through it.

In summary, the balanced growth discussions associated with development thinkers have greatly advanced the productive function of public spending (Hirschman et al., 1958; Rosenstein et al., 1943). But from the 1960s onward, these discussions were quickly hidden as the theory shifted towards short-term doubting and the debunking of the multiplier effect and the crowding-out effect of public investment. According to the Keynesian perspective, public spending was considered to have a stimulating effect on demand for the economy's recovery for almost thirty years, before it was shown to have a hidden productive role. Substantial improvement occurred in public expenditure in relation to growth in recent time. The study of how this investment affects economic growth is currently experiencing a rebirth, in large part because of the endogenous growth theory, which highlights the direct spillover produced by consumption of public goods.

In order to inform policy, it is crucial to do research on how human capital (HC) affects economic growth in South Africa. As proxies for HC, several empirical research (Barro et al. 1993; Bassanini et al., 2002) employ factors such as years spent in school, education attainment, and enrollment in schools. The dexterity levels of skilled, semi-skilled, and low-skilled labour will be used in this study to accurately determine the impact of employed labour on economic output throughout South African towns. Hanushek et al., (2015) also examine the returns connected to various measures of cognitive skills (human capital) using the skills proxy. Individual aptitude, work experience, and educational achievement are all factors considered

when measuring human capital according to various skill levels (Hanushek et al. 2015). This is consistent with the idea that education increases labour productivity and prepares individuals for a smooth transition to new technologies (Verspoor, 1990).

Even with all of these initiatives to invest in human capital, South Africa's GDP grows by only 10% on average. Our article is unique in that it provides an explanation after taking into account the efforts made by SA to increase expenditure on health and education over a ten-year period. It will draw attention from economic authorities to how spending on human capital affects Morocco's economic expansion. The state of the literature review, the methodology used, the results discussion, and the conclusion will occupy the remaining sections of the work.

2. Literature Review

From Solow's (1957) work on the origins of economic growth, traditional economic theory views worker productivity as an exogenous element that depends on the ratio of capital to labour as well as technological advancement, ignoring the importance of education and talent. But it wasn't until the 1990s that the primary driver of technological advancement in economic growth was thoroughly investigated, with Mankiw et al. (1992) introducing HC as an element of production. According to Solow (1956), Lucas (1988), and Nelson et al., 1966 HC plays a substantial role in economic growth. Nonetheless, they and other writers describe how HC influence growth using various frameworks. Nelson and Phelps conclude that greater endowment of human capital leads to enhanced levels of innovation. They argue that HC is a reagent that quickens production stages through invention and ease of change to new technical techniques of production.

Many research works that have examined how HC affects economic growth have employed various proxies; most of these studies have chosen to use the education variable as a stand-in for HC (Alina, et al., 2015; Awad et al., 2013; Barro et al. 1993). According to the endogenous growth theory, a particular degree of education promotes advancement in technology and favourably influences economic growth. Reverse causation is shown by the fact that increased innovation brought about by improved education is, in and of itself, a function of rapid economic expansion (Bayraktar-Sağlam 2016; Blundell & Bond 1998). Research into HC and government expenditure is the major determinants in explaining endogenous growth (Diagne, 2018). Dinçer et al., (2019) assert that there is a strong relationship between economic growth and investments in education because of a reverse causal relationship in which higher rates of economic growth led to higher levels of investment in education. The authors assert that the only fields that incorporate these elements are health and education. As a result, HC seems to be a crucial component

of economic expansion. The most common method used in the literature to evaluate the connection amid economic growth and HC is regression analysis across national contexts utilising physical capital and a number of other environmental factors. Denison (1961) attributes 23 percent of the U.S. economy's development between 1930 and 1960 to advancements in education. Credit for the first empirical research highlighting the connection between production and education goes to Romer (1990) and Lucas (1990). However, Schultz was possibly the first to point out that economists have always thought that labour explains the history of a country's wealth in a 1961 article. The concept of investment is expanded by the author to encompass any endeavours that improve a person's abilities and output, including health care costs, formal and continuing education, adult education initiatives (like agricultural extension), and migration. Then, HC theory pioneer Gianino et al., (2021) created a thorough theoretical framework that demonstrated the value of investing in HC. He views HC as an investment in knowledge, expertise, and training, health and other qualities that are intrinsic to the person. Depending on how HC is defined and how it affects economic growth, the literature explaining the connection between it and growth will change over time.

According to Issolah et al. (2021), human amplification can be used as a method to gauge how well a nation is doing at providing for the socioeconomic requirements of its citizens. They examine how human capital development affects economic growth using the Algerian Regional Development League (ARDL) model for the years 1986–2017. They come to the conclusion that growth and education are positively correlated, and that health care costs have a detrimental effect on economic growth.

Bamba et al. (2021) employ an ARDL model connecting health, investment, and human capital to economic growth from 1986 to 2018 in their study on the relationship between government expenditure on HC and growth in Mali. The empirical findings demonstrate the critical role that different facets of HC play and their beneficial effects on Mali's economic growth over the long and short terms.

Nuta, Lupu and Nuta (2023) examined the connection between public education spending and economic growth in Central and Eastern Europe using the ARDL structural break. The study's conclusions show that investments in public education and economic growth have long-term cointegration relationships for six nations: Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, and Latvia. Bulgaria invests less in public education than the EU average, but this nevertheless has an effect on economic growth. Investments in education have increased during the last 10 years, especially in the areas of physical infrastructure and IC&T resources. Several programs aimed at increasing salaries were put into place to attract highly skilled educators. Vocational education has become more popular, with a national enrollment rate greater than that of Europe.

Nuta, Nuta, Chirila, Roman, & Pusca (2015) employs Armey Curve Analysis to assess the relationship between governmental spending and economic growth in Romania. The results show that the period is characterized by erratic events like the shift from a state to a market economy and the global financial crisis, both of which are influencing the outcomes. This fact forces us to look for coordinates in order to create a new model that more accurately captures the relationships and period features.

El Houda Sadi et al., (2021) discover strong direct effects of fixed investment and basic and secondary education on real GDP using panel data for Algeria, Tunisia, Iran, Jordan, and Egypt. Benhabib et al., (2021) investigate the connection between economic growth and public health spending in 25 sub-Saharan African nations. The authors find that more money spent on public health could result in better health outcomes through longer life expectancies and, consequently, long-term economic growth using a VAR panel using data from 1996 to 2016.

The impact of dedicated health spending across the CEMAC subregion and the other five African countries is examined by Piabuo and Tieguhong (2017). They use panel estimate techniques such as dynamic joint least squares (DOLS), modified full ordinary least squares (FMOLS), and ordinary least squares (OLS). The findings demonstrated that, in the two samples taken into consideration, health care spending had a positive and significant impact on economic growth. In the other five African and CEMAC nations that reach the Abuja target, a one-unit change in health spending may raise GDP per capita by 0.38 and 0.3 units, respectively. This is a considerable difference between the two portions of roughly 0.08 units. Furthermore, in both sets of nations, there is a long-term relationship between health spending and economic expansion. Mohapatra (2017) employs a two-phase method to examine the causal relationship between economic growth, public health spending, and infant mortality in the Indian context by examining the association between economic growth and infant mortality rate (IMR). The findings indicate that whereas Granger government spending only increases long-term GDP, Granger GDP increases both short- and long-term government spending on health care. Additionally, we discover that long-term IMR raises public spending on economic development and health. Still, the opposite. There was no substantial correlation found between public health spending and/or economic growth and infant mortality. Health spending and economic growth in rising economies—that is, India, China, Russia, Indonesia, Mexico, and Turkey—are causally related, according to Dinçer and Yuksel (2019) for the years 1996–2016. They employ panel causal analysis by Dumitrescu et al., (2012) panel cointegration by Pedroni. Consequently, the authors discover evidence of a long-run causal relationship between economic growth and public health spending using the Pedroni panel cointegration test. But still, the latter is not true when it comes to private health spending and economic growth. The findings of the

Dumitrescu et al., (2012) panel's causal analysis conclude that there is no causal relationship between health care costs and economic growth.

It is also recognised that the primary driver of all public and private health spending is economic growth. Omitogun et al. (2016) demonstrate a positive and significant correlation between growth in Nigeria and human capital components (education and health spending) using the modified ordinary least squares (MOSL) approach. Researchers in the same nation discovered that expenditure on health and education contributed positively to growth (Ojo et al., 1995; Adamu, 2003; Mba et al., 2013). As a result, life expectancy and GDP growth are positively connected, and health investment has a greater impact than education spending. Other writers, though, have discovered contradicting outcomes. Budgets for primary education and health care, according to Lawanson (2009) and Jaiyeoba (2015), have a detrimental effect on growth. Keho (2009) uses a VAR model to argue that changes in GDP have a favourable effect on public expenditure in the health sector, but overall public spending and education have no meaningful impact on GDP. Upon concluding this summary of the theoretical and empirical literature analysis, we discover that different proponents place varying values on human capital when assessing its influence on economic growth. Additionally, a variety of estimating methods are applied.

Our contribution to the scientific inquiry is to concentrate on the South African situation, which has undertaken several investment initiatives in the fields of education and health. The study evaluates the potential connection benefits of these health and education spending on economic growth. This study employed variables that is different from previous studies which serve as another gap in literature government expenditure on educational total (% of government expenditure) and domestic general government health expenditure. Based on the researcher knowledge little or no studies have used these types of variables in their study.

3. Methodology

A World Bank database containing annual time series for the years 1990 through 2020 provided the information for the econometric estimates. With the use of an econometric model, we want to investigate how South Africa economic growth is impacted by public expenditure on education and health. The first model is the Solow growth model, which includes public investment in the production function and was developed by Barro (1999).

This basic model looks like this:

$$Y = f(K, L, G) \quad (1)$$

Thus:

Y= gross domestic product per capital (GDPC)

K= private investment

L= labour force

G= public investment

This study focusses on public expenditure on human capital and economic growth which will be intercepted by public spending on education and health in relation with other variables employed.

The model subsequently specified in linear form is:

$$GDPC = f(GEED, DGGHE, IMP, EXP) \quad (2)$$

$$GDPC = GEED + DGGHE + IMP + EXP \quad (3)$$

$$GDPC = \beta_0 + \beta_1 GEED + \beta_2 DGGHE + \beta_3 IMP + \beta_4 EXP \quad (4)$$

$$GDPC = \beta_0 + \beta_1 GEED + \beta_2 DGGHE + \beta_3 IMP + \beta_4 EXP + \varkappa \quad (5)$$

$$GDPC = \beta_0 + \beta_1 GEED + \beta_2 DGGHE + \beta_3 IMP + \beta_4 EXP + \hat{e} \quad (6)$$

GDPC is the dependent variable while GEED, DGGHE, IMP and EXP are the independent variables.

Equation (6) is modelled to show the connection amid GDPC and other specified variables in South Africa (SA). $\beta_0 - \beta_5$ are the parameters to be estimated in the model.

The data used in the study is obtained from World Development Indicator (WDI)

Definition of Variables

Variables	**Definition**	Source
GDPC	Gross Domestic Product Per Capita	World Development Indicator, 2020
GEED	Government Expenditure on total Education (% of government expenditure)	World Development Indicator, 2020
DGGHE	Domestic General Government Health Expenditure	World Development Indicator, 2020
Exp	Export	World Development Indicator, 2020
Imp	Import	World Development Indicator, 2020

4. Findings and Discussions

4.1. Unit Root Test

Determining the order of integration is essential to know the appropriate method for the study, hence, Table 1 presents the unit root test for the variables. As shown by both ADF and DF-GLS test. The Table confirmed that the variables are I(0) and I(1) order. Subsequently, no series are incorporated of order two I(2) or more, which is crucial for the application of the econometric specification of the VAR model in case of a mixture between stationary and non-stationary variables of order (1) containing a single unit root.

Table 1. Unit Root Testing

		ADF Null (H_0): Non-stationary				DF-GLS Null (H_0): Non-stationary			
		ADF_α				ERS_α			
	z_t	τ_μ	1%	5%	Prob.	τ_τ	1%	5%	Prob.
Intercept without Time Trend	DGGHE	-1.77	-3.85	-3.04	0.38	-0.38	-2.64	-1.95	0.38
	GEED	-2.11	-3.83	-3.02	0.24	-1.37	-2.65	-1.95	0.18
	IMP	-1.41	-2.71	-1.66	0.61	1.09	-2.65	-1.95	0.28
	EXP	-2.06	-1.67	-1.86	0.04	2.83	-2.64	-1.95	0.00
	GDPC	-2.46	-3.80	-3.02	0.13	-1.83	-2.65	-1.95	0.08
	$\Delta DGGHE$	-6.57	-3.86	-3.04	0.00	-6.03	-2.65	-1.95	0.00
	$\Delta GEED$	-4.00	-3.85	-3.04	0.00	-3.52	-2.65	-1.95	0.00
	ΔIMP	-3.36	-3.67	-2.97	0.02	-4.57	-2.60	-1.95	0.00
	ΔEXP	-6.31	-3.69	-2.97	0.00	-8.97	-2.65	-1.95	0.00
	$\Delta GDPC$	-1.63	-4.53	-3.67	0.00	-7.03	-2.65	-1.95	0.00
Intercept with Time Trend	DGGHE	-4.31	-4.49	-3.65	0.01	-0.84	-3.77	-3.19	0.40
	GEED	-3.51	-4.53	-3.67	0.06	-3.52	-2.65	-1.95	0.00
	IMP	-0.34	-4.29	-3.57	0.98	-1.45	-3.77	-3.19	0.16
	EXP	-5.24	-4.29	-3.57	0.00	-5.43	-3.77	-3.19	0.00
	GDPC	-1.44	-4.50	-3.65	0.99	-3.54	-3.77	-3.19	0.00
	$\Delta DGGHE$	-6.80	-4.57	-3.69	0.00	-7.28	-3.77	-3.19	0.00
	$\Delta GEED$	-3.93	-4.57	-3.69	0.03	-3.59	-3.77	-3.19	0.00
	ΔIMP	-3.61	-3.77	-3.57	0.05	-3.77	-3.77	-3.19	0.00
	ΔEXP	-6.19	-4.32	-3.58	0.00	-6.42	-3.77	-3.19	0.00
	ΔGDPC	-7.15	-4.14	-2.95	0.00	-7.31	-3.77	-3.19	0.00

Source: Author's Compilation, 2023

4.2. Lags Determination

Determination of lag structure is an essential part in determining the suitability of method suitable for the study. Since the optimum lag structure is established at 2 following the Schwarz information criterion. The estimation of Johansson cointegration test and thereafter the VAR procedure is established.

Table 2. Lags Determination

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-437.7514	NA	8.70e+19	48.75015	48.79962	48.75697
2	-434.6278	5.553050*	6.88e+19*	48.51420*	48.61313*	48.52784*
3	-434.6274	0.000565	7.70e+19	48.62527	48.77366	48.64573

Source: Author's Compilation, 2023

4.3. Cointegration Test

The cointegration test developed by Johansen is a multidimensional expansion that permits the model to contain more than one cointegration vector. By applying the maximum likelihood method, it ascertains if the model is cointegrated. The long-term relationship between both the endogenous and exogenous variables is the focus of the cointegration test. If the variables are stationary at the first difference, I(1), rather than at Level I(0), the cointegration test is performed.

Table 3. Test of Unrestricted Cointegration (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.925013	109.1939	69.81889	0.0000
At most 1 *	0.822371	59.97564	47.85613	0.0024
At most 2	0.600832	27.14253	29.79707	0.0982
At most 3	0.309785	9.693447	15.49471	0.3051
At most 4	0.130145	2.649148	3.841466	0.1036

Source: Author's Compilation, 2023

Trace test shows 2 cointegrating eqn(s) at the 0.05 level

Table 4. Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.925013	49.21831	33.87687	0.0004
At most 1 *	0.822371	32.83311	27.58434	0.0096
At most 2	0.600832	17.44908	21.13162	0.1518
At most 3	0.309785	7.044299	14.26460	0.4839
At most 4	0.130145	2.649148	3.841466	0.1036

Source: Author's Compilation, 2023

Trace test shows 2 cointegrating eqn(s) at the 0.05 level

4.4. Estimation of VAR

Table 4's result below demonstrates that DGGHE had a negative influence on economic growth in the second period but a positive impact in the first and third periods. GEED has consistently had a favorable and substantial effect on economic expansion. These findings are consistent with human capital theory and the empirical work of (Bamba et al., 2021). Experience has a detrimental effect on the second period and a good one on the first and third. Imp has a comparable effect on economic growth to exports, contributing favorably to growth in the first and third periods and adversely to growth in the second.

Table 5. VAR Output

	GDPC	DGGHE	GEED	EXP	IMP
GDPC(-1)	0.007617	-2.73E-10	1.73E-10	8.14E-11	-2.02E-12
	(1.68326)	(1.0E-10)	(7.3E-11)	(2.2E-10)	(1.5E-11)
	[0.00452]	[-2.66689]	[2.37906]	[0.37317]	[-0.13582]
GDPC(-2)	-6.091397	4.16E-10	-4.24E-10	-1.22E-10	-9.80E-11
	(2.12225)	(1.3E-10)	(9.2E-11)	(2.7E-10)	(1.9E-11)
	[-2.87025]	[3.22350]	[-4.63353]	[-0.44364]	[-5.22368]
GDPC(-3)	5.370328	-1.11E-10	2.64E-10	-1.45E-11	7.48E-11
	(2.16694)	(1.3E-10)	(9.3E-11)	(2.8E-10)	(1.9E-11)
	[2.47830]	[-0.84247]	[2.82860]	[-0.05164]	[3.90134]
DGGHE(-1)	4.33E+09	-1.271627	-0.064424	0.667088	0.123596
	(4.5E+09)	(0.27409)	(0.19450)	(0.58422)	(0.03989)
	[0.96015]	[-4.63953]	[-0.33122]	[1.14184]	[3.09829]
DGGHE(-2)	-3.02E+09	-0.769599	-0.478724	0.586067	0.009165
	(6.9E+09)	(0.41813)	(0.29672)	(0.89125)	(0.06086)
	[-0.43954]	[-1.84058]	[-1.61338]	[0.65758]	[0.15061]
DGGHE(-3)	5.02E+09	-0.056249	0.007406	0.476728	0.081541
	(3.6E+09)	(0.21715)	(0.15410)	(0.46286)	(0.03160)
	[1.40609]	[-0.25904]	[0.04806]	[1.02997]	[2.58003]
GEED(-1)	1.98E+10	-0.390305	0.504306	0.467375	0.321177
	(8.8E+09)	(0.53508)	(0.37971)	(1.14053)	(0.07788)
	[2.25099]	[-0.72944]	[1.32812]	[0.40979]	[4.12412]

GEED(-2)	9.09E+09	0.330065	-0.068801	0.078906	0.067217
	(5.1E+09)	(0.31166)	(0.22117)	(0.66431)	(0.04536)
	[1.77306]	[1.05906]	[-0.31108]	[0.11878]	[1.48185]
GEED(-3)	5.81E+09	0.403164	-0.073488	0.647910	0.106385
	(4.7E+09)	(0.28333)	(0.20107)	(0.60393)	(0.04124)
	[1.24507]	[1.42293]	[-0.36550]	[1.07282]	[2.57980]
EXP(-1)	2.40E+09	0.649275	0.038383	-0.333870	0.041540
	(3.7E+09)	(0.22547)	(0.16000)	(0.48059)	(0.03282)
	[0.64646]	[2.87969]	[0.23989]	[-0.69471]	[1.26586]
EXP(-2)	-4.47E+08	1.017656	-0.259621	-0.347020	0.034371
	(4.3E+09)	(0.25953)	(0.18418)	(0.55320)	(0.03777)
	[-0.10470]	[3.92111]	[-1.40964]	[-0.62729]	[0.90993]
EXP(-3)	5.62E+09	0.021332	0.249692	-0.297507	0.144787
	(4.7E+09)	(0.28514)	(0.20234)	(0.60778)	(0.04150)
	[1.19824]	[0.07482]	[1.23399]	[-0.48950]	[3.48886]
IMP(-1)	2.16E+10	9.338230	-4.185686	0.210385	0.525500
	(4.2E+10)	(2.53788)	(1.80099)	(5.40957)	(0.36937)
	[0.51685]	[3.67954]	[-2.32410]	[0.03889]	[1.42267]
IMP(-2)	8.75E+10	-9.629516	7.539485	0.022705	1.450384
	(4.5E+10)	(2.72958)	(1.93703)	(5.81820)	(0.39728)
	[1.94692]	[-3.52783]	[3.89229]	[0.00390]	[3.65082]
IMP(-3)	-4.04E+10	5.991097	-2.590208	-0.973797	-0.637300
	(2.6E+10)	(1.59218)	(1.12988)	(3.39379)	(0.23173)
	[-1.54192]	[3.76282]	[-2.29246]	[-0.28694]	[-2.75014]
C	-2.07E+12	-157.5981	-3.676323	38.42036	-17.82409
	(1.1E+12)	(64.8197)	(45.9989)	(138.165)	(9.43416)
	[-1.94449]	[-2.43133]	[-0.07992]	[0.27808]	[-1.88931]
R-squared	0.995759	0.991113	0.985448	0.696393	0.994464
Adj. R-squared	0.963951	0.924458	0.876305	-1.580662	0.952941
Sum sq. resids	9.37E+19	0.346073	0.174280	1.572360	0.007331
S.E. equation	6.85E+09	0.415977	0.295195	0.886668	0.060543
F-statistic	31.30564	14.86927	9.028996	0.305830	23.94966
Log likelihood	-413.4100	10.02239	16.19626	-3.600745	44.71331
Akaike AIC	47.71222	0.664179	-0.021806	2.177861	-3.190367
Schwarz SC	48.50366	1.455620	0.769635	2.969302	-2.398926

Mean dependent	3.17E+11	14.13333	18.72778	25.12032	25.24399
S.D. dependent	3.61E+10	1.513469	0.839331	0.551944	0.279088

Source: Author's Compilation, 2023

4.5. Variance Decomposition Test

Table 5 illustrates that the GDPC's variance to itself is 100% in the first quarter and drops to 88% and 86% in the sixth and tenth periods, respectively. About 99% of changes in economic growth are captured by DGGHE in the first period, 45% in the sixth, and 41% in the tenth (refer to table 6). In the first period, GEED explains 20% of differences in the country's growth; in the fifth and tenth periods, the variable captures an additional 13% and 12% of variations (refer to table 7). 53% of the fluctuations in the GDP through EXP during the first period were explained, but the percentage of variations drops significantly to 24% and 26% between the fifth and tenth periods (see table 8). It was noted that the IMP made a relatively small contribution to the nation. Tenth period (refer to table 9)

Table 6. Variance Decomposition of GDPC

Period	S.E.	GDPC	DGGHE	GEED	EXP	IMP
1	4.52E+09	100.0000	0.000000	0.000000	0.000000	0.000000
2	7.13E+09	97.97588	1.518988	0.058031	0.057262	0.389835
3	8.93E+09	94.51252	4.012927	0.145785	0.388239	0.940534
4	9.86E+09	92.96806	4.644791	0.175720	0.585111	1.626314
5	1.04E+10	90.95428	4.949679	1.209415	0.631966	2.254662
6	1.09E+10	88.68976	5.300985	2.644780	0.583425	2.781054
7	1.12E+10	87.34958	5.613409	3.366902	0.564916	3.105190
8	1.13E+10	86.78895	5.859359	3.602037	0.551917	3.197737
9	1.14E+10	86.48484	6.080532	3.714757	0.544895	3.174977
10	1.14E+10	86.19929	6.297931	3.801167	0.541387	3.160230

Source: Author's Compilation, 2023

Table 7. Variance Decomposition of DGGHE

Period	S.E.	GDPC	DGGHE	GEED	EXP	IMP
1	1.009506	0.533279	99.46672	0.000000	0.000000	0.000000
2	1.181063	16.33475	73.52364	0.001695	9.667948	0.471963
3	1.367644	25.58858	55.04279	9.247255	9.631437	0.489935
4	1.478624	25.25624	48.36149	14.05885	11.89512	0.428292
5	1.522568	24.48499	46.28691	13.48415	15.33986	0.404092
6	1.544066	24.73204	45.11611	13.19345	16.43001	0.528390
7	1.564835	25.82347	44.02669	12.84954	16.44770	0.852588

8	1.586654	26.73452	42.96902	12.67820	16.51134	1.106917
9	1.603735	27.01401	42.21446	12.58062	16.93014	1.260762
10	1.615554	26.97054	41.77076	12.45173	17.42697	1.379995

Source: Author's Compilation, 2023

Table 8. Variance Decomposition of GEED

Period	S.E.	GDPC	DGGHE	GEED	EXP	IMP
1	1.14E+10	78.25766	0.824645	20.91770	0.000000	0.000000
2	1.59E+10	76.06310	0.708077	20.38680	2.841881	0.000144
3	1.82E+10	75.68664	0.907477	16.71852	6.549274	0.138092
4	1.95E+10	76.05259	0.963166	14.71741	7.239265	1.027567
5	2.05E+10	75.84637	0.914986	13.93748	6.899324	2.401838
6	2.14E+10	75.53997	0.885920	13.33525	6.512345	3.726511
7	2.20E+10	75.26462	0.850516	12.78013	6.367124	4.737613
8	2.23E+10	74.83413	0.826371	12.44257	6.508788	5.388142
9	2.25E+10	74.30914	0.845193	12.27242	6.814694	5.758550
10	2.27E+10	73.84541	0.902468	12.16822	7.139468	5.944436

Source: Author's Compilation, 2023

Table 8. Variance Decomposition of EXP

Period	S.E.	GDPC	DGGHE	GEED	EXP	IMP
1	0.110047	39.24577	4.017758	3.440314	53.29616	0.000000
2	0.149508	54.59069	2.658995	1.978534	39.39727	1.374515
3	0.184688	64.77863	1.743759	1.354678	29.01851	3.104417
4	0.210739	68.03528	1.349540	1.510243	24.92352	4.181420
5	0.226388	67.97627	1.234505	1.460599	24.45946	4.869167
6	0.235693	67.08510	1.240093	1.351986	24.87887	5.443948
7	0.241815	66.30862	1.299861	1.323310	25.14042	5.927785
8	0.246122	65.72229	1.403881	1.278003	25.35800	6.237823
9	0.249278	65.08806	1.549796	1.284830	25.72371	6.353601
10	0.251666	64.34507	1.726407	1.360377	26.22477	6.343383

Source: Author's Compilation, 2023

Table 9. Variance Decomposition of IMP

Period	S.E.	GDPC	DGGHE	GEED	EXP	IMP
1	55047.30	2.042667	14.08841	0.086017	10.18586	73.59705
2	92652.23	0.727690	17.72109	1.467095	4.621586	75.46254
3	130212.0	0.434276	21.84693	2.877211	2.375946	72.46564
4	165349.1	0.405129	24.50010	3.039482	2.387313	69.66798
5	199741.3	0.619520	27.83291	2.303105	3.718597	65.52587

6	235025.2	1.182705	31.49118	1.668087	6.108588	59.54944
7	271813.5	2.025894	34.68559	1.432792	9.069634	52.78609
8	309997.1	2.909191	37.21247	1.591122	12.02748	46.25974
9	349285.1	3.637746	39.12764	2.082930	14.70822	40.44347
10	389352.2	4.143811	40.51223	2.804642	17.06430	35.47502

Source: Author's Compilation, 2023

5. Conclusion and Recommendation

This study uses the VAR technique to investigate the relationship between public spending on health, education, and economic growth in South Africa. The findings of the study show that DGGHE had a negative influence on economic growth in the second period but a positive impact in the first and third periods. GEED has consistently had a favorable and substantial effect on economic expansion. In ageing nations, a lot of the current discussion centres on whether or not governments should spend more on health and education in order to lessen the negative effects of decreasing growth. Furthermore, new empirical research indicates that the best place to invest in developing nations like South Africa is in higher education, as this will boost economic development, productivity, and creativity. This begs the question of what is the ideal amount of public funding for higher education. However, because how taxes are raised has a significant impact on the desired outcomes, the topic of how much more public money should be spent on skills and human capital cannot be addressed in a vacuum. The current study examines these questions by evaluating the relationship between government spending on health and education in the context of South Africa using the VAR model. Higher education incentives may quicken the buildup of human capital and lessen the adverse effects of slower growth, according to VAR research. Nevertheless, the effect is contingent upon the distortions inferred from substitute tax mechanisms and the effectiveness of public education spending. But in the more likely case, where the reform is financed by cutting other public spending, the economy experiences both increased growth and welfare improvements.

In view of these outcomes, economic policies need to recognize the orientation of human capital expenditures toward long-term investments. In fact, this reflects their increasingly minor impact

as one moves towards the long term. Moreover, if public spending is directed more towards investments in human capital, this will translate into the quality of human capital including health and education on the one hand, and on the other hand, enhance the value of the citizens through training and employment.

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