

The relationship between education expenditure and economic growth in South Africa from 1987 to 2021

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Abstract

Does education encourage economic expansion? On this issue, empirical evidence is inconclusive. The relationship between government spending on education and economic growth in South Africa between 1987 and 2021 is examined using the time-series method. The empirical findings demonstrate that spending on education has a favorable and considerable impact on economic growth over the long and short terms. According to the estimations of the error correction model, a 1% increase in average education spending per worker will, in the short run, result in a 0.06% increase in output. According to co-integration calculations, a long-term increase in average worker education spending of 1% will result in a 0.2% gain in output.

Keywords: VAR model, relationship, education expenditure, economic growth

Introduction

Education - Training is an indispensable activity for the socio-economic development of each country. To have a developed economy, a civilized society requires a human resource developed both physically and intellectually. The product of education and training is human, a particularly important factor in producing material wealth for society. The level of proficiency and human skills has a direct impact on labor productivity. The formation of skills is necessary through education and training. In 1987 - 2021, the State gradually increased investment in education and training from more than 13% to 20% of the total state budget expenditure on education in South Africa. Data for the period 2000 - 2021 shows that the education budget increases over time, an average increase of 121.18% per year with the average increase per year. The level of education budget spending and the economic growth over the period 2000 - 2012

grew strongly. So are they related or not? The article analyzes to find the relationship between these two quantities.

Literature Review

In this regard, a great deal of translational research has extensively explored whether educational attainment can significantly contribute to the economy's overall output. On the one hand, these macro studies continue to produce inconsistent and controversial results (Pritchett 1996). For example, Permani (2009) in his study of development strategies in East Asia concluded that the region places more emphasis on education. His research shows a positive relationship between education and economic growth in East Asia. Meanwhile, there is a two-way causal relationship between education and economic growth.

Pradhan (2009) supports this finding and demonstrates that education has a high economic value and should be considered a source of national capital. He suggested that this capital must be invested and that India, must take advantage of this human resource development and the physical capital that contributes to the country's economic growth. Afzal et al. (2010) acknowledge that education has a positive long-term and short-term relationship to economic growth in Pakistan. This is consistent with the findings from Lin (2003) and Tamang (2011) on their studies in Taiwan and India. In addition, Baldacci et al. (2004), documenting 120 developing countries from 1975 to 2000, show a positive long-term relationship between education costs and economic growth.

Considering the case of Nigeria, Omojimate (2010) used both co integration and Granger causality analysis to investigate the education-economic growth nexus from 1980-2005. The results suggested a co integration relationship between public expenditures on education, primary school enrolment, and economic growth. Moreover, there is unidirectional causality from public expenditures on education to economic growth. However, there is no causality from primary school enrolment to economic growth. The author explained this last result by the fact that the teaching program of Nigeria's primary school is based on the one of Western education system and, thus, doesn't consider local reality.

Following Omojimate (2010), Urhie (2014) analyzed the effect of public education expenditure on education attainment and economic growth in Nigeria from 1970 to 2010. The particularity of the study is that the author disaggregated public education expenditure in two components. The first one is the recurrent

expenditure (teachers' salary, meal subsidy to students...) on education and the second one is the capital expenditure on education. The methodology used by the author relies on an Instrumental Variable Two Stage Least Squares approach. The results revealed a positive impact of education capital expenditure on education but a negative effect on economic growth. Besides, there is a negative effect of education recurrent expenditure on the level of education and a positive and significant effect on economic growth. One interesting result is that there are both indirect and direct effects of public education expenditure on economic growth in Nigeria. Urhie (2014) justified his result by the multiplier effect of recurrent expenditure on economic growth (direct effect). Moreover, although the education expenditures might not be used in the education sector, the rest of the economy could benefit. Also, even if investments in education increase, there is not necessarily a gain in enrolment rates.

A study conducted for the Pakistani economy by Kakar, Khilji, and Khan (2011) confirms a positive long-run relationship between education and economic growth. Findings of Odit, Dookhan and Feuzel (2010) revealed that human capital led to an increase in output of the Mauritian economy and capital formation explained approximately 60% of GDP growth rate. According to Musila and Belassi (2004), a 1% increase in average educational expenditure per worker led to about 0.04% increase in output in the short-run and 0.6% in the long-run.

The literature on the Indian economy has had a mixed response. Bosworth, Collins and Virmani (2007) concluded that education's contribution to India's economic growth has been negligible. In another study Chandra (2010) tested the causality between investment in education and economic growth in India and concluded a bi-directional causality between them. Pradhan (2009) took a data set from 1951-2001 and confirmed that there exists a long and short-term relationship between education and economic growth in the Indian economy and the direction of causality is from economic growth to education but there is the absence of reverse causality.

Meanwhile, Becker (1964) argues that men will certainly invest in education because education will bring them a promising return in the future. This rational decision, he argues, will enable the individual to ensure that the investment in education is effective in terms of the cost, return, and opportunity that he or she pays in pursuing his or her education. Lin's (2004) study on Taiwan's economy concluded that higher education positively and significantly impacts the country's economic growth. The author compares

findings across disciplines and finds that engineering and the natural sciences play an important role. Empirical studies on the Ugandan economy by Musila and Belassi (2004) show that an average 1% increase in education costs per worker will lead to a 0.04% increase in the country's short-run production and an increase of 0.6% in long-term production. However, Kakar et al., (2011) in their study in Pakistan, concluded that there is no significant relationship between education and short-run economic growth but that educational development impacts the country's long-term economic growth. These findings demonstrated that government spending on the education sector positively impacts a country's economic growth in the short and long term.

Research Methods

Automated Regression Research (VAR) is a multivariate prediction algorithm used when two or more time series influence each other. The structure of each variable is a linear function of its own past lags and the other variables' past lags. The standard VAR model has the following form:

$$X_t = A_0 + A_1X_{t-1} + \dots + A_pX_{t-p} + e_t \quad \text{v} \text{ } \text{ } t = 1, 2, \dots, t$$

Where X_t is the endogenous vector variable of k -dimensionality and p is the lagged order. A_p is the k -dimensional coefficient matrix, e_t is the random error. VAR models can evaluate dynamic relationships between common endogenous variables and their interactions with minimal economic assumptions.

VAR model and variance decomposition to test the impact between two variables of economic growth (GDP), government spending on education (GE) are detailed into two equations as follows:

$$\begin{aligned} \text{LNGDP}_t &= \alpha + \sum_{i=1}^k \beta_i \text{LNGDP}_{t-i} + \sum_{j=1}^k \phi_j \text{LNGE}_{t-j} + u_{1t} \\ \text{LNGE}_t &= \delta + \sum_{i=1}^k \beta_i \text{LNGDP}_{t-i} + \sum_{j=1}^k \phi_j \text{LNGE}_{t-j} + u_{2t} \end{aligned}$$

Research Results

Stationary test

The stationarity test will avoid the situation of the pseudo-regression series. However, if a linear combination between non-stationary series is a stationary series, then the regression is a true regression and those non-stationary time series are said to be co integrated. In other words, if the residual in the model

The SC and HQ standards give a delay of 2, FPE and AIC give a delay of 2, and finally, LR gives a delay of 1 (table 2). A delay of 1 can lead to an ordering of correlation in the residuals, and the model cannot be generalized satisfactorily. Using too many hysteresis steps in the model can lead to many repulsive reactions, which have a strong oscillation over time, because it may not satisfy the stability condition for the VAR model. Therefore, the author considers the optimal delay 2 to be appropriate. Besides, delay 2 also satisfies the necessary conditions better.

Check model stability

Testing the stability of the model is a very important step in evaluating the model and giving more accurate evaluation results. A model is considered stable if all the original units of the characteristic polynomial AR are within the unit.

Table 3: Model stability test

Eigenvalue stability condition

Eigenvalue	Modulus
.9412293	.941229
.8895244	.889524
-.2714103	.27141
.1921565	.192157

All the eigenvalues lie inside the unit circle.
VAR satisfies stability condition.

All values are < 1, VAR model is stable

Estimating the VAR model

With a delay of 2, we have the following results of the VAR model:

Table 4: Results of testing the VAR model

		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lnngdp							
lnngdp							
	L1.	1.141925	.1886808	6.05	0.000	.7721172	1.511733
	L2.	-.0644098	.2184765	-0.29	0.768	-.4926159	.3637963
	lnge						
	L1.	-.1116524	.1039906	-1.07	0.283	-.3154702	.0921654
	L2.	.028558	.0947229	0.30	0.763	-.1570955	.2142114
	_cons	-.0804976	.4518217	-0.18	0.859	-.9660518	.8050565
lnge							
lnngdp							
	L1.	-1.085452	.2510414	-4.32	0.000	-1.577484	-.5934202
	L2.	1.530564	.2906848	5.27	0.000	.9608319	2.100295
	lnge						
	L1.	.6095751	.1383603	4.41	0.000	.3383939	.8807564
	L2.	-.0006937	.1260296	-0.01	0.996	-.2477071	.2463197
	_cons	-2.521753	.6011524	-4.19	0.000	-3.69999	-1.343516

Check for the existence of a linear relationship between two quantities of education budget spending and GDP. GDP is considered as an indicator variable (independent variable).

Figure 1: Result of the push response function between GE and GDP

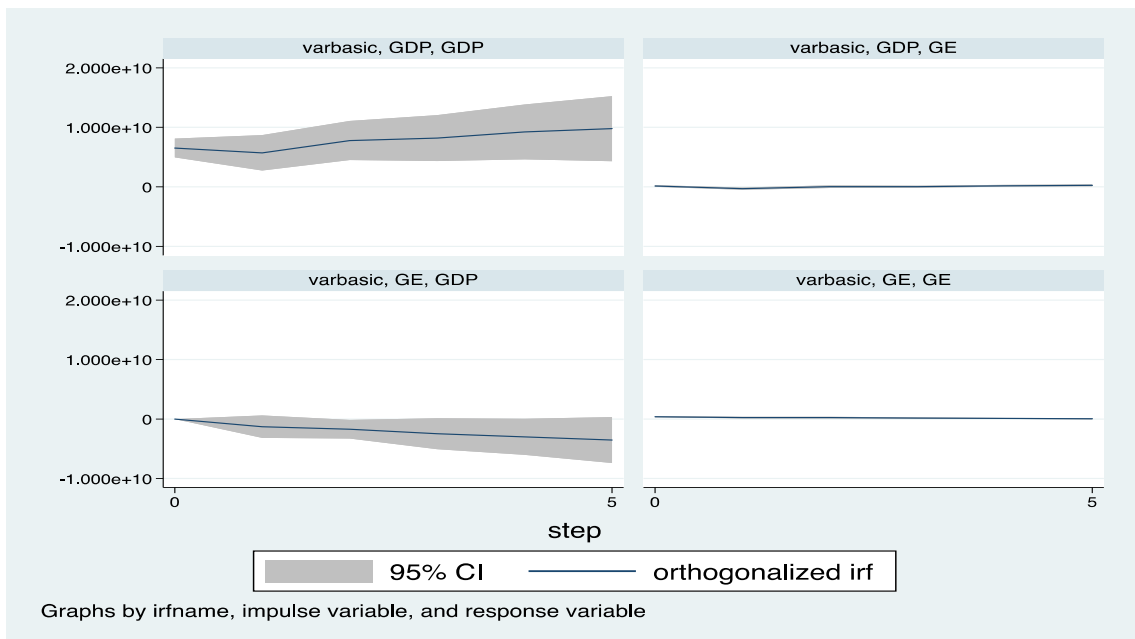


Figure 1 shows GE's response to GDP, if a shock occurs then education spending will fall in the second cycle of the response. A GDP shock changes GE, but it doesn't take effect until year 2.

Conclusion

This paper investigates the impact of government education spending on economic growth in South Africa between 1990-2021. Using the vector automated regression (VAR) method, the study shows that GDP has a positive long-run relationship with government spending on education (GE). All of these indicate an important relationship. The results confirm that education has a long-term relationship with economic growth. Better education standards will improve the efficiency and productivity of the workforce and influence economic growth in the long run. Furthermore, in the short term education causes economic growth and vice versa. This finding implies that quality education is essential to increase the country's economic growth and human resource capacity. Therefore, it is suggested that the government should increase spending on the education sector to improve economic efficiency

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