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THE EFFECT OF EDUCATION EXPENDITURE ON ECONOMIC GROWTH: THE CASE OF THE KINGDOM OF SAUDI ARABIA

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ABSTRACT

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KSA.

The relationship between the cost of education and economic growth is among the studies attracting interest in economic literature. This study revealed that education expenses in the Kingdom of Saudi Arabia had a positive effect on economic growth for the period 1990–2017, and is explained as follows: first, in the long term, with an estimated flexibility value of 0.89, which means that a rise in education expenditure of 1% would lead to an increase in economic growth of 0.89%, and second, in the short term, the relationship between domestic production and the volume of expenditure is also statistically positive and significant with the estimated value of partial flexibility being 0.3, which means that an increase in education expenditure by 1% would lead to a rise in the domestic production volume by 0.3%. Furthermore, a higher allocation of resources for education expenses could make the KSA economy more dynamic.

Contribution/Originality: This study is one of very few studies that have investigated the effect of spending on education on economic growth in the KSA using Autoregressive Distributed Lag (ARDL) Models. The paper's primary contribution is finding a positive relationship between spending on education and economic growth rate.

1. INTRODUCTION

There is no doubt that development is necessary in all societies. Both developed and developing countries use the same approach that can only be achieved through educational institutions. Therefore, education has an effective role in promoting societies to establish continuous development in order to promote social and economic progress.

Saudi Arabia is no exception when it comes to the need to develop its educational system. Its commitment to developing educational sectors has been substantial, which is evident from the budget that has been allocated to education. The ratio of education expenditure has been associated with an increase from 105 million riyals in 2010 to 215 million riyals in 2017. In addition, the education expenditure in GDP increased from 16.2% in 2010 to 23% in 2017.

In real terms, the average annual increase in education expenditure between 2010 and 2017 was 49%. This expenditure remained steady between 2012 and 2015 and saw a significant rise thereafter. However, in recent years,

the Kingdom of Saudi Arabia has witnessed a major boom in spending on education and human capital along with the 2030 vision for significant economic growth, indicating that education constitutes one of the most important aspects to the success and development of countries.

Considering the importance of education expenditure on developing the economics of countries, it is noted that spending on education contributes to wealth creation. The argument is that the ability to create, adopt and make better technological and technical progress is combined with the investment in human capital and the efficiency of the education system. Therefore, it is beneficial for countries to invest significantly in these areas in order to train the workforce and develop the necessary skills that help to increase economic growth and ensure the success of a country.

Recently, the question of spending on education is a common point of discussion in both developed and developing countries. In the developed countries, they are focused on taking full advantage of the education system in order to improve the knowledge and innovation that is required for the growth of their national economy. While in developing countries, the question is still related to the need to generalize and democratize access to the education system, since a large portion of the population still has no access to the system.

According to these ideas, we aim to answer to the following questions in this paper:

- 1) Is there any relationship that combines economic growth and education expenditure in the context of KSA?
- 2) Can education expenditure have an effect on the economic growth on KSA?

To achieve this, we refer to literature that explains education expenditure and economic growth to identify the purposes of the research. In addition, to verify these purposes, a quantitative method is taken based on the ARDL model to quantify the effect of education expenditure on the development of the Saudi economy.

2. LITERATURE REVIEW

Denison (1697) was a pioneer in acknowledging the importance of investing in education, which was thought to impact growth and development by encouraging activities that can help to advance and catch up with foreign technological progress (Berthelemy & Varoudakis, 1996).

The importance of human capital for growth has been stressed by the internal growth approach, which is responsible for increasing returns to scale in the long term (Romer, 1986). The primary component of education is considered to be a crucial driver of economic performance and, for this reason, many governments have made considerable investments in this sector. Several theoretical studies have examined this relationship between education and growth (Cardak, 2004; Eckstein & Zilcha, 1994; Glomm & Ravikumar, 1992; Pissarides, 2000; Zhang, 1996).

However, few research studies have empirically tested the correlation between public education spending and economic growth using time series and panel data (Gylfason, 2000; Sylwester, 2000; Sylwester., 2002).

Although the theoretical literature supports this positive relationship, the empirical works have failed to find a robust result. While many studies confirm a positive effect of education expenditure on economic growth (Gary, Kevin, and Robert, 1990), others present a negative relationship (Sylwester., 2002).

In one of the pilot studies in educational-economic growth literature, the existence of a strong positive relationship between educational and economic growth was suggested (Barro, 1991). Liao, Du, Wang, and Yu (2019) stated that the development of education promotes growth of the economy, which, in turn, has a positive effect on the development of education. Along the same lines, Kobzev et al. (2018) argue that there is compelling evidence proving a positive connection between education levels and economic growth in India. Plabita (2019) demonstrates that educational development is a fundamental way to sustain the economic growth of a country.

Despite several studies expressing a relationship between education and economic growth, some studies have suggested that there is no significant relationship between these two variables. Griliches emphasizes that there is

no relationship between education and economic growth in his findings, though it is claimed that these results were derived from low quality data and measurement errors, which Griliches denies (Mehmet & Sevgi, 2014). In this context, Eric (2016) argues that simply adding more years of schooling without increasing cognitive skills has had little systematic influence on growth.

The investment in human capital by the public sector is indicated as the reason for this conflict in the study. Hirsch and Giovanni concluded that the wealth and accumulation of human capital were essential determinants for growth in Italy. According to this, it is noted that human capital has an important and positive effect on growth in the sectors where human capital is widely used (Hirsch & Giovanni, 2009).

Among the studies researching the relationship between education and economic growth, in Turkey (Kar, Nazlioglu, & Ađır, 2011) and Yılđor, Ertugrul, and Celepcioglu (2012) concluded that education and economic growth made important mutual contributions. Government expenditure on education is positively related to economic growth in both regions. The results produced new evidence to establish that the differences in growth rates within East and South Asia are associated with differences in educational progression in the regions (Anjum & Atiq, 2017).

An increase in government spending on education and improvement in trade openness, especially from the export side, are important elements in economic growth in emerging countries like South Africa (Akinwale & Grobler, 2019).

Education is the process through which the personalities of individuals change and develop in a positive direction by adopting different content according to the age and needs of individuals (Zoran, 2015). To explain this importance, a study presented by Karambakuwa, Ncwadi, and Phiri (2019) shows an insignificant effect of human capital on economic growth from our selected sample. These findings remain unchanged even after adding interactive terms to human capital, which are representative of government spending as well as direct foreign investment. In addition, an increase in human capital may induce a rise in the number of entrepreneurs and innovative products, thus indirectly driving economic development through innovation. They conclude by proving that human capital is crucial for economic development today (Claude & Ralph, 2019).

3. EMPIRICAL STUDY

Our study is based on research presented in literature, especially those proposed by the Saudi Arabian Monetary Authority (SAMA), in the applied side. The analysis carried out during this research is based on an annual series of the Saudi economy from 1990 to 2017.

We used a quantitative method to assess the effect of education expenditure on the development of the Saudi economy. The method used employs various mathematical formulations, from which we select the most appropriate that reflect this relation. Table 1 provides the combination of different formulations that we can use in this study to explain this relation, namely the power model, exponential model, and logarithmic model.

Table-1. Mathematical Forms to the Regression model.

Model	Mathematical form	Reformulation	Description
(lin–lin)	$GDP = a + b \cdot EX$	none	$EX \times 1 \text{ unit} \rightarrow gdp \times b \text{ units}$
Power (log–log)	$GDP = a \cdot EX^b$	$\ln GDP = a' + b \cdot \ln EX$	$EX \times 1 \% \rightarrow gdp \times b \%$
(log–lin)	$GDP = a \cdot e^{b \cdot EX}$	$\ln GDP = a' + b \cdot EX$	$EX \times 1 \text{ unit} \rightarrow gdp \times b \times 100\%$
(lin–log)	$GDP = a + b \cdot \log EX$	$GDP = a + b \cdot \ln EX$	$EX \times 1 \% \rightarrow gdp \times b / 100 \text{ units}$

Source: Nick (2005).

We will then show that these variables are non-stationary. According to this assumption, the long-term study of their relationship poses a problem that the regression we get is often false. These results corroborate with those

of Granger and Newbold (1974), and in this case, we opted to use the cointegration test, which was originally developed by Granger, C. W. J (Granger, 1981).

It also allows the relationship between unstable and integrated time series to be carefully studied in a long-term plan. Therefore, it should be noted that among the models that addressed this problem, those by Johansen and Juselius (1990); Engle and Granger (1987); and Johansen (1988) can be cited.

Furthermore, according to the ARDL approach that attempts to estimate the relation between long- and short-term at the same time, and in the same equation, it is possible to insert the dummy variables in the integrated common test (Nkoro & Uko, 2016).

The ARDL model was determined by Pesaran, Shin and Smith, whose estimate requires following the next four steps (Pesaran, Shin, & Smith, 2001).

3.1. Unit Root Test

In this research, the stationary levels of variables were analyzed using the augmented Dickey–Fuller test (ADF) and the Philips–Peron test (PP), which allow us to obtain results at the same time for all variables through the Eviews 10.0 program. Table 2 below summarizes these results.

Table 2. ADF, PP, Unit root test results.

Unit Root Test Table (Pp)					
At Level					
LGDP	LEX	GDP	EX		
-0.4701	-1.3424	-0.0943	0.3583	t-Statistic	With Constant
C ns	C ns	C ns	C ns ¹		
-1.6420	-4.0659**	-1.8828	-1.5067	t-Statistic	With Constant & Trend
T ns	T ns	T ns	T ns ²		
2.8943	3.3043	1.7042	2.3096	t-Statistic	Without Constant & Trend
At First Difference					
d(LGDP)	d(LEX)	d(GDP)	d(EX)		
-4.5238***	-9.2907***	-4.3465***	-4.3360***	t-Statistic	With Constant
-4.4294***	-9.1881***	-4.3178**	-4.6449***	t-Statistic	With Constant & Trend
-3.6669***	-6.7132***	-3.8461***	-3.7294***	t-Statistic	Without Constant & Trend
UNIT ROOT TEST TABLE (ADF)					
At Level					
LGDP	LEX	GDP	EX		
-0.4512	-1.3335	-0.0943	0.5524	t-Statistic	With Constant
C ns	C ns	C ns	C ns		
-1.6420	-3.8340**	-1.8828	-1.3980	t-Statistic	With Constant & Trend
T ns	T ns	T ns	T ns		
3.0163	2.5243	1.7042	2.7047	t-Statistic	Without Constant & Trend
At First Difference					
d(LGDP)	d(LEX)	d(GDP)	d(EX)		
-4.5198***	-9.8725***	-4.3439***	-4.2524***	t-Statistic	With Constant
-4.4249***	-9.6621***	-4.3140**	-3.7430**	t-Statistic	With Constant & Trend
-3.6669***	-7.8584***	-3.8461***	-1.6085*	t-Statistic	Without Constant & Trend

Note: *, ** and *** indicate significance at levels 10%, 5% and% 1, respectively. Constant is not significant. 2 Trend is not significant.

From Table 2, we observe that the EX and GDP variables are determined as I(1) according to the ADF and PP test. It is noteworthy that the value of the calculated statistics for the ADF and PP tests is inferior to the scheduled statistics in the three models at a level of 5%.

The obtained results confirm the acceptance of either hypothesis $(H_0 : \lambda = 0)$, or $(H_0 : \phi_1 = 1)$.

On the other hand, the trend is not significant in the third model for the two ranks (series). It means that these two series are unstable according to DS type, while the calculated value $\tau_{\hat{\phi}}$ for these tests for the first-order differentiator ranks becomes more important than the scheduled statistics in the three models at a level of 5%; thus it is stable at the first-degree I(1). It is the same for the logarithm of the two series (ranks), which means that they are stable at the first-degree I(1).

3.2. Cointegration Analysis: (Bounds Test)

At this point, a common integration between the two changes is verified by applying the bounds test. This test is based on the Wald test to reveal a parallel relationship between variables in the long term. To achieve this, it is important to convert the previous general model to the unrestricted error correction model (UECM), which uses the following formula 01:

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^p b_i \Delta GDP_{t-i} + \sum_{i=0}^p c_i \Delta EX_{t-i} + \delta_1 GDP_{t-1} + \delta_2 EX_{t-1} + \varepsilon_t \dots\dots (1)$$

Between the two variables in the equation, (01) is tested by the following assumptions cointegration analysis:

-Null assumption: $H_0 : \delta_1 = \delta_2 = 0$, there is no common integration

-Alternative assumption: $H_1 : \delta_1 \neq \delta_2 \neq 0$ there is a common integration. This test follows Fisher's non-standard distribution, so the rejection or the acceptance of the null assumption depends on the comparison of Fisher's calculated value, which uses the following formula 02:

$$F = \frac{(SSER - SSEU)/m}{SSEU/(n-k)} \dots\dots(2)$$

To verify the existence of a long-term parallel relationship, a statistical calculation has been made by the bounds test. The obtained results are shown in Table 3.

Table 3. Results of the common integrated test based on the bounds test.

the common integrated test based on the Bounds test						
$F_{critical}^*$		Significance Level	K	F_{cal}	Results	Model
I(1)	I(0)					
4,94	5,58	%1	1	0,57	Accept the null hypothesis of a lack of common integration	LIN-LIN
3,62	4,16	%5				
3,02	3,51	%10				
4,94	5,58	%1	1	3,86	Inevitable test (uncertain area)	LIN-LOG
3,62	4,16	%5				
3,02	3,51	%10				
4,94	5,58	%1	1	3,29	Inevitable test (uncertain area)	LOG-LIN
3,62	4,16	%5				
3,02	3,51	%10				
4,94	5,58	%1	1	4,65	Accept the alternative hypothesis of a shared integration	LOG-LOG
3,62	4,16	%5				
3,02	3,51	%10				

Note: It is obvious from the table that the calculated F statistics are greater than the upper critical value displayed in the last model. In this respect, hypothesis H0 is rejected, and the existence of a cointegration relationship between the variables can be concluded.

It is observed that the F Statistics calculated in Table 3 are higher than the upper critical value in the last model. In this case, hypothesis H0 is rejected and it can be concluded that there is a cointegration relationship between variables.

According to the table above, Fisher's calculated statistic value (4.65) is more important than Fisher's tabular at P=5%, which means that the alternative assumption is accepted, and the null assumption is rejected. Hence, a long-

<i>statistic</i>	$\chi^2 = 0,12$	$F_{(2,22)} = 0,85$	$F_{(1,24)} = 1,49$	$F_{(1,23)} = 2,21$
<i>probability</i>	0.94	0.43	0.23	0.15

Note: * Significant at 10%, ** Significant at 5%, *** Significant at 1%

According to Table 4, it is clear that the model Log-log represents the best model. The ARDL model requires us to add time lagging variables into the model as explanatory variables so that we get the best ARDL model (1.1) in terms of the number of delays based on a Schwarz standard.

By using the Eviews 10 program, it is possible to get the results by estimating the short- and long-term parameters of the ARDL model summarized in Table 5.

3.4. Diagnosing and Evaluating the Estimate Results

Given the long- and short-term equations of the previous ARDL model, the error correction parameter limit is within 5% of the expected negative signal. This result is considered to support a relationship between the two variables, and it also reflects the speed at which the model is adapted to move from short-term to long-term equilibrium, where the error-correction limit coefficient is (-0.23). Moreover, GPD is adjusted towards its equilibrium value each time by a proportion of the remaining imbalance from the period (t-1) equivalent to 23%.

This can be explained by the fact that when GPD deviates during the short period (t-1) over its long-term balance value, 23% of this deviation is corrected in the period (t). Furthermore, it can be said that the GDP variable needs about 4.35 years to adjust towards its equilibrium value.

According to the table above, the R² value is 0.16, which means that the changes in the volume of education expenses only explain 16% of GDP fluctuations. They are also considered as evidence of the lack of quality of the model’s reconciliation and its ability to explain the changes that occur GDP. In addition, the Durbin–Watson test does not suggest a self-correlation between first-degree errors.

The Table 5 shows the following:

1. The JB test statistics indicate that the hypothesis that random errors are physically distributed in the estimated model is not rejected.
2. The Breusch–Godfrey test statistics reveal that the phantom is no more than a one-degree shield link problem.
3. ARCH test statistics shows that the null assumption, based on the random error limit variance is constant in the rated model, is not rejected.
4. The reset test statistics indicate that the function used in the model is correct.

3.5. Model Structural Stability Test throughout the Period

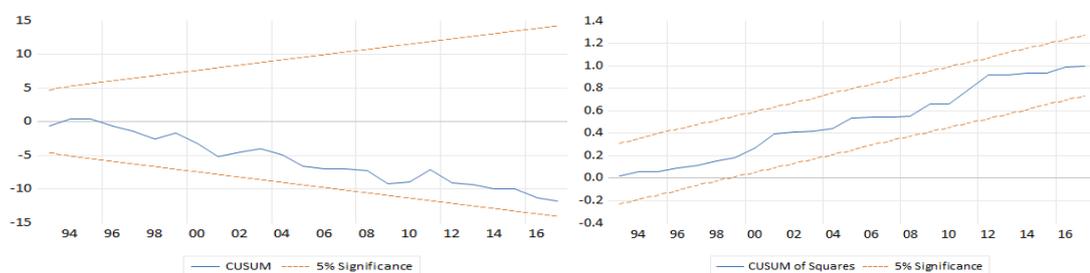


Figure-1. Graph of each CUSUMSO and CUSUM.

Figure 1 shows that the estimated parameters of the model are structurally stable over the study period. The graph of the two-test count cited for this model occurs within critical limits at a level of 5%.

4. RESULTS

At the end of this study, and according to our context of research, we conclude that the literature review we adopted allowed us to better analyze and evaluate the relationship between education expenditure and economic growth. Expenditure on education is a fundamental requirement to further the development of countries' economics.

The relationship between education expenses and economic growth in the Kingdom of Saudi Arabia between 1990 and 2017 was examined. As a parallel result with other studies, it was found that there was a positive and significant relationship between education expenses and economic growth. More resources allocated to education, especially higher education, will contribute greatly to KSA's economic growth, and will have positive effects on the performance of the KSA economy. This will be realized by increasing knowledge production, teaching, and the construction of new universities.

A statistically positive and significant impact on the long-term level of education expenditure on GDP, with the estimated long-term flexibility value of 0.89, means that a rise in education expenditure of 1% would lead to an increase in economic growth of 0.89%.

The relationship between domestic production and the volume of expenditure was also statistically positive and significant, with the estimated value of partial flexibility in the short term being 0.3. This means that an increase in education expenditure by 1% would lead to a rise in the domestic production volume by 0.3% in the short term.

In general, the results are logical and agree with economic theory in the short and long term. To explain these results, we can cite the indispensable role that investment plays in the education system. Investment in education is a fundamental necessity and can be justified by improvements in the quality of education and an increase in enrollments in different levels of education. In addition, the expenditure on education is related to the orientations of the education system towards profitable and high-value educational channels added for students, which are a major predictor for economic growth. In this way, learning should be considered a priority for development because it helps students to acquire the skills and abilities they need to succeed in their professional lives. Furthermore, investment in scientific research will facilitate and accelerate technological development, which represents a vital driver for economic growth. Therefore, the objective is to improve the research in economic development of a country.

At the end of this study, according to [Akinwale & Grobler \(2019\)](#), the results help us to make policy suggestions that can establish positive connections between economic growth and development in KSA. First, the strategy to improve the nation using science and education should be implemented, and the government should develop an appropriate strategy to allocate resources to education in order to improve its returns to the economy. What is more, the government ought to raise the proportion of financial expenditure in education to ensure the coordinated and sustainable development of education and economic growth. Second, educational institutions should be actively improved, and the efficiency of educational investment should be raised in all regions in the Kingdom of Saudi Arabia. In addition, it is recommended that the connection between education levels and economic growth, with the inclusion of other variables, is tested and generalized, which will be interesting to analyze in future studies.

We conclude that policies on education expenditure must be reviewed and updated, which will be advantageous for wealth creation. This would mean that the role of the government would no longer just be to invest massively in education, but to set up the economic environment to increase the benefits of education for economic development.

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