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An ARDL Approach to Investigating the Link between Education Spending and Economic Growth in Egypt

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Abstract: In this paper, we explore the correlation between public spending on education and economic growth in Egypt. The paper seeks to shift the narrative surrounding education from a service to an investment. The study employs the Autoregressive Distributed Lag (ARDL) co-integration technique using time series data from 1996 to 2022. The findings support previous research indicating a positive and significant long-term relationship between education spending and GDP growth at a 5% significance level. While the short-term relationship is negative, the highly significant negative error correction term (ECT) suggests that the whole model adjusts toward long-run equilibrium at a speed of 48%. The study concludes with recommendations for the variables examined and considers the broader context.

Keywords: Egypt, Economic Growth, Public Spending, Education, ARDL.

1. Introduction

In their relentless and continuous search for causes and drives of economic growth, economists have always placed great emphasis on education. Recently, literature on the association between education and economic growth moved away from theoretical and intuitive statements to more empirical research. This trend in research attempted to reach more decisive and statistically based conclusions on that relationship. Studies within this trend continue to make arguments for more expenditure on education more compelling, particularly in developing countries. That type of research is essential as governments make decisions on priorities of public spending given all the global challenges facing the world and strongly impacting developing countries. The results of these studies may allow decision-makers to make reasonable predictions as to the future of economic growth and provide the basis for financial decisions with confidence in long-term returns. The aim of the research is to provide visions for policymakers whose decision-making affects the structure of the government budget and government spending. [1-4]

Egypt, like other developing countries, faces the dilemma of meeting multiple demands on its limited resources. Moreover, Egypt has faced major changes on all fronts; political, social, and financial since 2011 [5]. Since 2014, the state has strived for stability. Major efforts have taken place to simultaneously maintain stability and rebuild the country with a vision for an economically and industrially strong state (Egypt's Vision 2030). To achieve this vision, Egypt's recognized that its strongest asset is its youth.

This conviction demonstrated itself clearly in the constitution of 2014 where the state is committed to allocating a percentage of government spending that is no less than 4% of the GPD for education and will gradually increase to reach international standards. The main purpose of this study is to study the effect of public education spending on economic growth in Egypt and to derive recommendations that could help policymakers to enhance education levels and economic growth. The paper is structured as follows: The first part presents the introduction and the literature review. The second part is the literature review and the derived hypothesis. The third part shows the methodology used. The fourth part is the applied study. The fifth part presents the results, and the sixth part gives the conclusion and recommendations.

2. Literature review and derived hypothesis

2.1 Literature review

The evolution of the Human Capital Theory has had a major impact on the discourse of the value of education, particularly in developing countries with struggling economies. Re-conceptualizing "capital" from "material and equipment" to "human development" paved the way for change in the perception of education expenditure. It shifted the notion of

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education from a service that is of no return and a burden on the state's budget to a necessary investment with an expected economic return. The collected works [6-8] emphasized the harmonizing association between human capital and physical capital. [8]'s advice in 1961 to developing countries to adopt policies that invest in human beings as a way to achieve desired economic growth still stands true and is being verified continuously by economists and development scholars.

The theory provided a framework for what appears to be not only intuitively logical but also research-based, as studies continue to highlight the importance of governments' conviction that developing their human resources is a key variable in achieving economic growth.

The link between public spending on education and economic growth in developing countries

The question of the link between spending on education and economic growth motivates research and economic policies, particularly at times of economic crises. Studies of this relationship are taking place at both the level of developing and developed countries.

[9] examined the validation of what they called the "education-led economic growth hypothesis" in Malaysia after the 2008 world economic crisis where they used the Cobb-Douglas production function theory. They concluded that the government's financial planning in relation to education policies should be done with care and accuracy to ensure success. The researchers asserted that specific financial arrangements for developing human capital is crucial to ensure spending contributes to long-term sustainable economic development.

[10] investigated the association between public spending in the educational sector and economic growth since the Indonesian government decided to spend 20% of the state budget on education. They used annual data from 1988 to 2018 and the Cobb–Douglas production function as an economic theory for measurement. They contended that the relationship may be insignificant; however, there is a direct link in the long-term and an inverse link in the short-term estimation.

[11] examined the impact of government outflow on economic growth in Ghana using data from 1970 to 2016, employing ARDL econometric estimation technique. Their findings indicate that a direct association exists between government spending on education and economic growth in the short run.

In 2022, [12] analyzed the consequence of education public spending and the economic development of regions in Turkey. The researchers hypothesized a strong relationship between education expenditures and economic growth/development and used static and dynamic panel data (system GMM) methods. They used data on central government education expenses and regional GDP per capita data for the period 2004-2019 for 81 provinces at the NUTS-III level. It was concluded that there was a direct relation between central government education expenses and regional development, yet the increase was not as strong as they anticipated. A ten percent increase in education only increased economic development by 1.1 percent.

[7] examined the broader impacts of education in Africa, going beyond just its influence on growth and health. They presented a fresh perspective on how education spending can indirectly affect various aspects of development. According to their findings, investing in education has positive effects on infant mortality rates, population growth, civic institutions, democratization, investment in physical capital, economic growth, poverty reduction, inequality, and crime prevention. They concluded that these indirect effects of education are more significant than the direct ones. While some effects are immediate, there are longer time lags that African countries need to address in order to fully harness the benefits of education.

[13] investigated the education public expenditure on Per Capita GDP in 139 developing countries over the period 1957-2015 and contrasted the impact with the Sub-Saharan African (SSA) countries' average. She used the system General Method of Moments (GMM) estimator proposed by [14]. [13]'s study concluded that "expansion in education expenditure in developing countries affects per capita GDP positively, and the effect is not different from that of SSA countries." (p. 136)

The link between public spending on education and economic growth in developed countries

It is observed when comparing the studies investigating the link between public spending and economic growth, in developing and developed countries is that they share the same concern over education spending, however, EU and BRICS countries are on a quest for increasing public spending on education, from the perspective of the knowledge-based economy. In developing countries, research is tied to developing human resources to increase production. Rarely was a knowledge-based economy mentioned in relationship to education.

[15]'s Null hypothesis, that there is no relationship between EU and BRICS countries (Brazil, Russia, India, China, and South Africa) public expenditure on education and the observed GPD of these countries, was rejected. In this study data were obtained from the Eurostat of the GDP values for the period of 2002-2011 as well as the amount of public expenditure on education for the same period expressed as a percentage of GDP.

Based on the obtained data it was concluded that by 2008 an average of 5% of GDP was used to finance education in the 28 countries members of the European Union. Contrary to what might be expected in economic crises in developing countries, EU countries, after 2009, increased the allocation of funds for education, to maintain the competitive advantage of the EU Member States in relation to the rest of the world's economy to recover from the economic crisis. This action from EU countries should be the subject of further studies by developing countries' economists, educationalists, and high-level policymakers.

The link between public spending on education and economic growth in Egypt

Several Egyptian scholars have investigated the relationship between public expenditure on education and economic growth. They have chosen different time series, different variables, and different methodologies. Studying the relationship between poverty, employment, and education, [5] chose the time period (1908-2014) and used the Johansen Cointegration technique and Vector Error Correction Methodology. Their findings proved the existence of a positive relationship between the two variables in the long run and a negative impact in the short run due to the growing rate of unemployment. They maintained that "Employment indicators demonstrate the significance of human capital development, for example, working in primary or tertiary activities in public or private sectors requires relatively higher qualifications in human resources. Accordingly, enhancing the educational attainment levels will decrease the likelihood of being poor and in particular for higher educational levels." (P. 1)

[16] selected the time series 1990/1991- 2013/2014. In [16], the variables were GPD, public revenues, students' enrollment, and employment. One of the study's results is that by increasing expenditure on education by %1, the GDP increases by %56. This result confirms that economic growth is tied to human resources development and that general investment that does not have parallel investment in education, is likely to have less effect on increasing rate of economic growth. (p.217).

[17] conducted a study investigating the direction of the relationship between education, material investment, and economic growth in a panel of five MENA countries (Algeria, Egypt, Morocco, Tunisia, and Turkey) from 1975 to 2014. They used Granger causality tests, variance decomposition, and impulse response functions to a panel data framework through the Arellano-Bond difference GMM estimator. They identified a causal relationship between education and economic growth and between education and investment. They concluded that emphasis on physical investment will not yield the desired results, contrary to investment in human capital which promises growth both in the medium and long run.

In the 2022 World Bank Report on Egyptian Public Expenditure for human development: Social Protection, Education, and Health, it was maintained that "The historical trend in public spending is one of low allocation to the social sectors, services. Spending on health, education, and scientific research is low by international standards and has been declining in real terms despite the country's aspirations - as spelled out in its Constitution - to reach adequate levels of spending on human development. This has severely impacted social services and outcomes. In education, shortages in teachers and classrooms are undermining the quality of the learning environment at the pre-tertiary levels, while the increased enrollment in higher education is not met with adequate funding to sustain public universities and support research." [18]

2.2 Hypothesis

The hypothesis of the study suggests that a nation's economic growth relies on the development of its human capital, which is closely tied to its level of education. The study incorporates several factors that are strongly linked to both education and economic growth, as they also influence this association. Drawing from existing research, we consider the possible impacts of the unemployment rate and public spending on education on economic activity. The central hypothesis of the study posits that there is a positive correlation between the amount of public funds allocated to education and economic growth in Egypt.

3. Research methodology

The econometric approach is used to examine how the annual increase in government spending on education in Egypt affects GDP growth from 1996 to 2020. In this study, the Autoregressive Distributed Lag (ARDL) co-integration technique is employed.

The ARDL co-integration method is preferable when dealing with variables that have different levels of integration, such as I(0), I(1), or a combination of both. It is also robust when there is a sole long-run relationship between the variables under consideration, particularly in situations with limited sample sizes. The F-statistic (Wald test) is used to determine the presence of a long-run relationship among the variables. If the F-statistic exceeds the critical value range, it indicates the existence of a long-run relationship. However, it's important to note that the ARDL co-integration method will not work if the variables are integrated at their second difference (I(2)). [19]

The Bound Test method, developed by [20], is used to test co-integration through ARDL (Autoregressive Distributed Lag) modeling. This approach incorporates both autoregressive and distributed lag models. In this model, the dependent variable is influenced by its own past values as well as the current and past values of the independent variables [21].

3.1 Variables and data sources

The data used for analysis covers the period from 1996 to 2020 and includes various variables.

Y: GDP growth rate

X1: unemployment rate

X2: the annual increase in government spending on education.

These data were obtained from [22], as well as [23].

3.2 Model framework

The study methodology utilizes the ARDL method in three phases.[20]

- The first phase involves testing for co-integration within the framework of the unrestricted error correction model. This model includes the following components:

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{m} \beta_i \Delta Y_{t-i} + \sum_{i=0}^{n} \theta_i \Delta X_{t-i} + \lambda_1 Y_{t-1} + \lambda_2 X_{t-1} + \eta_t \quad (1)$$

The coefficients λ_1, λ_2 in the equation represent the relationship between variables in the long run, while the β, θ represents the relationship in the short run. The term Δ refers to the change in variables over the past year, and m and n represent the time lags for each variable. It is important to note that the number of time periods for lagged variables may differ, and the random error term η has an average value of zero, a constant variance, and no correlation between its values.

- The Wald-F test is used to examine the hypothesis of no co-integration between variables and determine the long-term equilibrium relationship between them. This test relies on certain assumptions in order to be valid.

Null hypothesis: no co-integration $H_0 : \lambda_1 = \lambda_2 = 0$

Alternative hypothesis: co-integration $H_1 : \lambda_1 \neq \lambda_2 \neq 0$

The decision to reject the null hypothesis is made by comparing the calculated F value with the critical values from a table. The proposed critical bounds consist of a lower critical bound (LCB) and an upper critical bound (UCB). If the calculated F value is greater than the UCB, the null hypothesis is rejected in favor of the alternative hypothesis (common integration). On the other hand, if the calculated F value is smaller than the LCB, the null hypothesis (no common integration) is accepted. When the calculated F falls between the UCB and LCB, the result is unsettled. [21]

- Phase II involves estimating the long-term equation when there is co-integration of the variables.

$$Y_t = \alpha_0 + \sum_{i=1}^{p} \vartheta_i Y_{t-i} + \sum_{i=0}^{q} \delta_i X_{t-i} + \varepsilon_t \quad (2)$$

According to [20], when using the ARDL model, the selection of time lags (represented by p and q) is done based on the Akaike Information Criterion (AIC) or Schwarz Bayesian Criterion (SBC). These criteria help in determining the optimal number of lags that should be included in the model. For annual data, it was recommended to use a maximum of two-time lags. The aim of including these lags is to address any serial correlation present in the random errors. Once the appropriate lag order has been determined, the model can be estimated using the Ordinary Least Squares (OLS) method.

• Phase 3: Error Correction Model (ECM) is constructed, taking the following formula:

$$\Delta Y_t = c + \sum_{i=1}^{p} \vartheta_i \Delta Y_{t-i} + \sum_{i=0}^{q} \delta_i \Delta X_{t-i} + \psi ECT_{t-1} + \upsilon_t \quad (3)$$

The error correction coefficient ψ quantifies the rate at which the short-term imbalance in equilibrium adjusts towards long-term equilibrium.[22]

- Previous studies [23-25] and economic theory suggest that the following equation can be used to assess the impact of annual increases in government spending on education in Egypt on the GDP growth rate between 1996 and 2020.

$$yt = \vartheta + \alpha 1.yt\text{-}i + \ldots + \alpha p.yt\text{-}p + \beta 1.x1t + .. + \beta q1.xt\text{-}q1 + \beta 2.x2t + \ldots + \beta q2.x2t\text{-}q2 + \epsilon t$$

Where:

Y= GDP growth rate

X1 = unemployment rate

X2= the annual increase in the government spending on education in Egypt

ε = random error.

p is a number of lags of *y* (lag order of *y*)

q is a number of lags of *x* (lag order of *x*).

It is important to mention that when using the ARDL model, there is no requirement for stationarity tests. However, it entails that there is no stable time series at the second difference, which could impact the accuracy of the results. The appropriate lag periods will be determined based on the AIC criteria.

3.3 Diagnostic tests

Several tests will be performed in order to check stability, normality, serial correlation, and heteroscedasticity**.**

4. Empirical results

4.1 Stationarity tests

Stationarity tests were conducted, and the results indicate that variables Y and X2 are stationary at their original level. However, variable X1 was found to be stationary only after applying the first difference as displayed in the next table:

Table 1: summary of the stationarity test results

VARIABLE	ADF test statistic	T-statistic	Order of integration
Y	**-3.176782**	**-3.020686**	I(0)
X1	**-3.305895**	**-3.012363**	I(1)
X2	**-3.474839**	**3.004861**	I(O)

Source: done by the researchers using e-views 10

4.2 Time lags number

The number of time lags is calculated by using the AIC standards, which suggests using one lag period for variables Y and X1, and zero lag periods for variable X2.

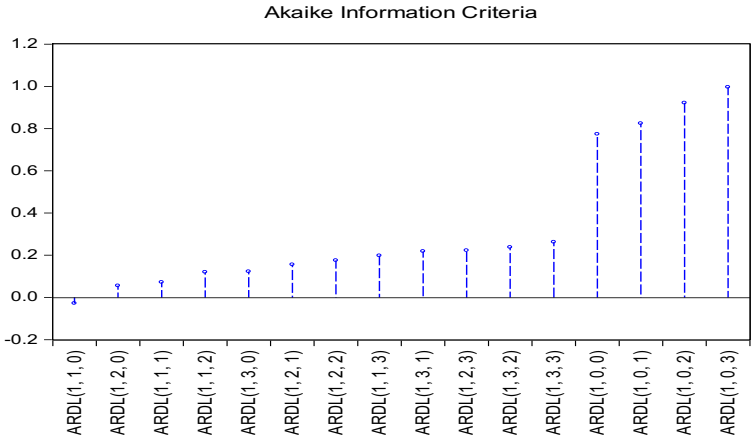

Fig. 1: time lags selection output using e-views 10

Source: done by researchers using e-views-10

The lag order of the model needed to be determined before estimating the coefficients. The optimal lag order for each variable in the model was determined using the Akaike Criterion (AIC) based on the actual statistics of the sample data. Figure (1) above shows that the ARDL (1,1,0) was identified as the most suitable lag order, as it has the lowest value.

4.3 Estimation and specifications

- **The error correction illustration of the ARDL model**

According to reference [21], the error correction illustration of the ARDL model can be stated as follows:

$$D(\log Y)_t = C_1 + C_2 D(\log Y)_{t-i} + C_3 D(\log X1)_{t-i} + C_4 D(\log X2)_{t-i} + C_5(\log Y)_{t-1} + C_6 \log X1_{t-1} + C_7 LOGX2_{t-1} + E_t$$

- **The short-run relation**

The short-run relation is specified by the next table

Table 2: ARDL model: short run relation

Dependent Variable: LOG(Y)				
Method: ARDL				
Selected Model: ARDL(1, 1, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
LOG(Y(-1))	**0.558505**	**0.175935**	**3.174486**	**0.0055**
LOG(X1)	**-2.105114**	**0.510474**	**-4.123843**	**0.0007**
LOG(X1(-1))	**2.015624**	**0.472863**	**4.262600**	**0.0005**
LOG(X2)	**-0.139358**	**0.062414**	**-2.232807**	**0.0393**
C	**1.122018**	**1.175781**	**0.954275**	**0.3533**
R-squared	**0.753292**			
F-statistic	**12.97684**	**Prob(F-statistic)**		**0.000050**

Source: done by the researchers using e-views 10

The table shows that the model is significant in the short run as the value of the Prob (F-statistic) is too small. The value of the coefficient of determination equals 0.753292 meaning that 75% of the change in y in the short run is interpreted by the model. There are significant effects of the variables and their lags on the GDP growth rate as the absolute values of t-statistics are more than 2 and the prob. Values are less than 0.05. There is a highly significant effect of the unemployment rate and its first lag on the GDP growth rate, the annual change in the spending on education is significantly and negatively related to the GDP growth rate.

- **The Bound test**

Table 3: ARDL bound test

ARDL Bounds Test				
Null Hypothesis: No long-run relationships exist				
Test Statistic	**Value**	**K**		
F-statistic	**4.784441**	**2**		
Critical Value Bounds				
Significance	**I0 Bound**	**I1 Bound**		
10%	**3.17**	**4.14**		

Source: done by researchers using e-views 10

The bound test is used to determine whether there is a long-run association among variables. The null hypothesis suggests that there is no such connection. We evaluate this using the F-statistic: if the value of the F-statistic is lower than a certain threshold (I(0)), we do not reject the null hypothesis, indicating no long-run association. On the other hand, if the F-statistic exceeds another threshold (I(1)), we reject the null hypothesis, indicating the presence of a long-run association. When the F-statistic falls between these two bounds, it is unsettled, and we cannot make a decisive determination. In this case, the F-statistic value of 4.7 is higher than the upper bound of 4.14, suggesting the existence of a long-run association with a significance level of 10%.

- **Estimation of long-term coefficients**

Table 4: long run relation output

Long Run Coefficients				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
LOG(X1)	**0.146976**	**0.914775**	**0.160669**	**0.8742**

LOG(X2)	**0.670471**	**0.248420**	**2.698947**	**0.0152**
C	**-1.640600**	**2.905147**	**-0.564722**	**0.5796**

Source: done by researchers using e-views

There is a strong and statistically significant direct relationship between spending on education and GDP growth. This relationship is supported by a probability value of 0.0152, which is below the commonly used 5% significance level. Additionally, the absolute value of the t-statistic is greater than 2, further confirming the significance of the relationship. Specifically, for every 1% increase in annual spending on education, the GDP growth rate is expected to increase by 0.67%. This conclusion is based on the coefficient of 0.670471 for the variable representing spending on education.

- **Error correction model**

The identification of an error correction model is justified by the presence of co-integration as follows:

Table 5: Error Correction Model

Cointegrating Form				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
DLOG(X1)	**0.191819**	**0.510474**	**0.375767**	**0.7117**
DLOG(X2)	**0.325850**	**0.062414**	**5.220790**	**0.0001**
CointEq(-1)	**-0.486001**	**0.175935**	**-2.762384**	**0.0133**
Cointeq = LOG(Y) - (0.1470*LOG(X1) + 0.6705*LOG(X2) -1.6406)				

Source: done by researchers using e-views 10

The ECT, or Error Correction Term, indicates the extent to which any previous instability is being corrected in the current period. A value of ECT = 1 means that 100% of the correction occurs within the period, while ECT = 0 suggests no correction and no indication of a long-run relationship. In the present case, the ECT has a negative sign with a highly significant coefficient of -0.486001 and a probability value of 0.0133, indicating convergence. The speed of correction for the entire model towards long-run stability is 48%, as indicated by the CointEq(-1) coefficient of -0.486001, meaning that 48% of the correction occurs each year.

4.4 Diagnostics tests

- **Checking stability**

To ensure that the data used in this paper do not contain any changes in structure over time, the Cumulative Sum of Recursive Residual (CUSUM) test is employed. This test helps determine the structural stability of the estimated ARDL model. If the CUSUM graph falls within the critical limits at a significance level of 5%, it indicates that the estimated coefficients of the UECM are also structurally stable.

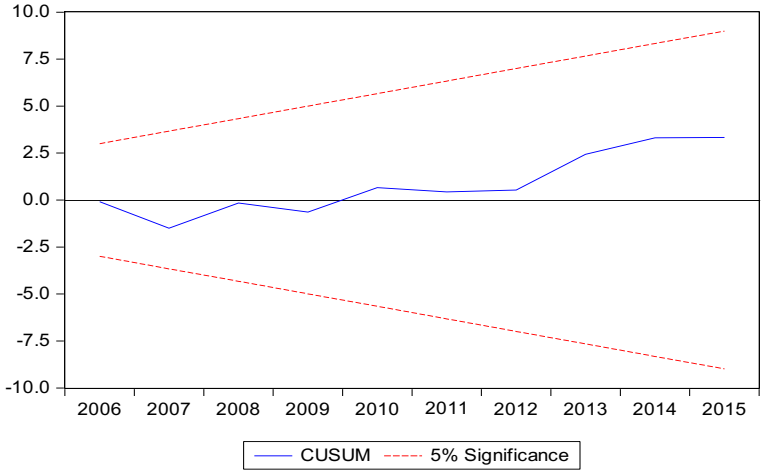

Fig. 2: Cusum test

Source: done by researchers using e-views 10

The CUSUM graph indicating the estimated coefficients for the ARDL model suggests that they remain stable throughout the study period, as it falls within the critical limits.

- **Checking serial correlation**

However, it is essential to verify if the residuals exhibit any self-serial correlation by conducting the Breusch-Godfrey Serial Correlation LM Test in the following manner:

Table 6: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	**0.396163**	**Prob. F(1,16)**	**0.5380**
Obs*R-squared	**0.531563**	**Prob. Chi-Square(1)**	**0.4660**

Source: done by researchers using e-views 10.

Based on the information provided, we can conclude that the null hypothesis, which assumes no serial correlation between the residuals, is acceptable because the p-value is greater than 0.05.

- **Checking Heteroscedasticity**

Table 7: Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	**1.117724**	**Prob. F(4,17)**	**0.3807**
Obs*R-squared	**4.581072**	**Prob. Chi-Square(4)**	**0.3330**
Heteroskedasticity Test: ARCH			
F-statistic	**2.864329**	**Prob. F(1,19)**	**0.1069**
Obs*R-squared	**2.751098**	**Prob. Chi-Square(1)**	**0.0972**

Source: done by researchers using e-views 10

Based on the information provided in the table, we can infer that there is no evidence of heteroscedasticity, meaning that the variance remains constant in the residuals. This conclusion is drawn from the fact that the null hypothesis of no heteroscedasticity is not rejected at a significance level of 0.05, as the p-value is greater than 5%.

- **Checking Normality**

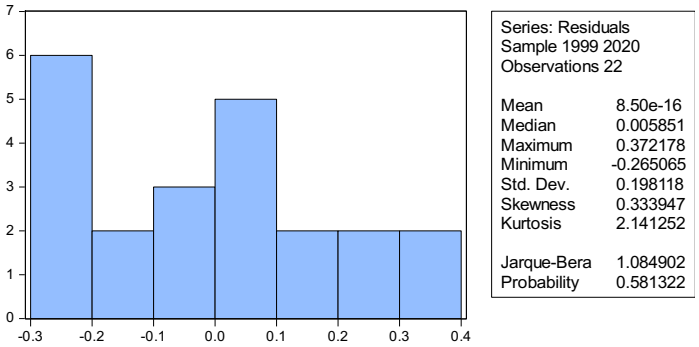

Fig. 3: Jarque-Bera normality test

Source: done by researchers using e-views 10

The Jarque-Bera (JB) test is a statistical test used to assess the normality of residuals. The null hypothesis of the JB test states that the residuals are normally distributed. In this case, the obtained p-value is 0.581322, which suggests strong evidence in favor of the normality of the residuals. Since the p-value is greater than the conventional significance level of 5%, we fail to reject the null hypothesis, indicating that the residuals can be considered normally distributed.[26]

5. Results

- In the short term, the model is highly significant, and it explains 75% of the changes in y. Specifically, there is a significant and negative relationship between annual changes in education spending and GDP growth.
- The bound test suggests a long-term relationship with a significance level of 10%, indicated by an F-statistic value of 4.7 exceeding the upper bound of 4.14.
- Based on the estimation of the long-term relationship, a 1% increase in education spending growth is associated with a 0.67% increase in GDP growth.
- The error correction term is both negative and highly significant, indicating convergence. The entire model adjusts towards the long-run equilibrium at a speed of 48%.

- The ARDL model's estimated coefficients remain stable throughout the entire study period, as indicated by the conducted CUSUM test.
- The residuals follow a normal distribution, and there is no evidence of serial correlation based on the results of the Breusch-Godfrey Serial Correlation LM Test. Additionally, there is no heteroscedasticity observed, suggesting that the model is well-suited.

6. Conclusions and Recommendations.

The study conducted on the impact of education spending on economic growth in Egypt from 1996 to 2020 has discovered a strong and statistically significant positive relationship between education spending and GDP growth rate in the long run, with a significance level of 5%. It has been found that for every 1% increase in annual education spending growth, the GDP growth rate will increase by 0.67%. Although there is a negative short-term relationship between the two variables, the error correction term (ECT) is highly significant and negative. This indicates that the model adjusts towards the long-run equilibrium at a speed of 48% per year. In other words, 48% of the necessary adjustment occurs annually.

The results of this study, viewed from a wider perspective, confirm that funding education is bound to achieve greater economic growth in spite of political turmoil and adverse environment. Egypt is a case in point. The data set selected for this study (1996-2020) includes turning points in Egypt's modern history, where the country sustained two revolutions, a wave of terrorism, and unprecedented global circumstances. The results encourage decision-makers, particularly in developing countries, to keep education a priority in their budget allocation. The leadership of developing countries needs to trust that prioritizing education is perhaps the only way to achieve prosperity in their countries.

Egypt has increased investment in education during recent years, yet Covid 19 adverse effects and the Russian-Ukraine war have put further restrain on Egypt's economy. In spite of these challenges, Egypt aims to improve its education and is currently establishing the Higher National Council for Education and Training as a regulatory body to ensure Egypt's education plans are relevant, connected to the job market, and monitored.

In spite of the challenges, the study recommends increasing the spending on education and prioritizing education as the most powerful investment for Egypt's future. It is recommended that the Government prioritize spending on education to reach international standards as per the Egyptian constitution. There should be a greater role for economic institutions in financing education with a percentage of their annual profit. Involving the private sector is another means of increasing investment in education keeping an eye on fair access to quality education for all, inclusion, and gender disparity. It is proposed in this study that the involvement of the private sector in education should be regulated so that part of its annual profit should be devoted to the development of public education.

Funding of public education should also take into consideration the quality of educational services provided. Investing in providing students with opportunities for innovation and exploration and creativity, is a must in order to increase their productivity and yield the desired economic growth and development.

It is recommended that mutual coordination between the labor market and education policies be developed in a way that improves the performance of the education system and develops required skills. It is also recommended that further studies on the relationship of educational levels, the exact allocation of expenditure on education, and measures of quality of education be conducted in relationship to economic growth. These studies should be done meticulously in order to guide sound budget allocation.

Education is a long-term investment that requires consistency and perseverance. Commitment and patience are necessary to resist the pressure to decrease the budget allocation for education in favor of other more visible and quick-return wins. As mentioned above, EU countries continued to increase expenditure on education during times of financial crises to maintain their competitive edge. This experience provides developing countries with an example to follow.

Conflict of interest

The authors declare that there is no conflict regarding the publication of this paper.

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