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The Role of Education in Driving Economic Growth in Lebanon

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Abstract

This study explores the relationship between government expenditure on education and economic growth in Lebanon over the period 1993–2023. It aims to assess whether public investment in education contributes positively to economic development.The research employs a quantitative approach using time-series data obtained from the World Bank. The relationship between government spending on education and GDP growth was analysed using the Stata software to estimate the model and test the significance of key variables.Contrary to prevailing economic theories, the results indicate a negative relationship between government spending on education and economic growth in Lebanon. This finding challenges the conventional belief that investment in education necessarily fosters growth, highlighting the importance of examining the quality and efficiency of such spending. The inverse relationship suggests that education spending in Lebanon may suffer from inefficiencies, poor allocation, or systemic issues that limit its positive impact on growth. This underscores the need for structural reforms in the sector.The study recommends a comprehensive reform strategy that includes better governance of public funds, administrative reform, increased transparency, improved teacher recruitment and training, and innovation in curricula. Such changes are crucial to enhancing the effectiveness of educational investment and its contribution to economic growth.

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1. Introduction

Education is the process of enhancing the gaining of knowledge, skills, and habits. This process can be short-term or long-term (Rambeli, Hashim, Leh, Hashim, & Jalil, 2020).

education is essential in order to protecting human life and promote economic growth, or sustainable development. It is considered the bridge that allows civilizations to develop and liberate mindsets to achieve social progress and economic growth. Historically, education has been viewed as essential for societal progress, as reflected in the phrase, "There is no salvation in this world except through knowledge" (Abdullayev, 2021).

From a microeconomic perspective, education is a durable consumer good, an expense that must produce wealth for learners in the future, and the microeconomic approach to education is based on comparing the difference in wages between different educational structures, and the cost required to achieve an appropriate level of education (Strober, 1987).

Education and economic growth are closely related, starting with investment in human capital to improve productivity and increase production and thus increase economic growth. Economic theories such as Keynesian demand theory have focused on increasing government spending as a means of improving the economy by improving public goods (Keynes, 1936, cited by Meltzer (1981)). The Solow growth model states that labor and technological progress are the main drivers of economic expansion (Solow, 1956).

In order to achieve economic growth and improve the educational system, the role of the state in providing high-quality educational services is highlighted. One of the educational programs that countries can

resort to achieve this is the partnership between the Ministry of Education and Higher Education and the World Bank. This program aims to guarantee the quality of the educational system and accomplish the objectives of educational policy. In Lebanon, tests to evaluate the educational system, such as: (TIMSS) Trends in International Mathematics and Science Study (Mullis, Martin, & von Davier, 2021) the Program for the Analysis of Educational Systems (PASEC) (Michaelowa, 2003) and the Program for International Student Assessment (PISA) (Rautalin & Alasuutari, 2009) showed that it ranked 25th out of 43 participating countries and that school management policy and environment affect school results. It also showed that first-year high school students have a lower level of mastery, and in mathematics, these students passed level 2.

This article seeks to know whether public policies in Lebanon consider education as a major means of acquiring human capital and whether it is a catalyst for economic growth. To achieve this, econometric models were tested to prove whether there is a relationship between the variables involved in implementing public policies, and to know whether educational curricula of public policies have a positive impact on economic growth. The aim of this is to analyze the result of the study according to the relationship between the following variables: government spending on education (%), number of secondary school enrollments, total labor force participation and gross fixed capital formation, as independent variables of economic growth represented by GDP (per capita GDP), which is a dependent variable.

2. Literature Review

Economists have been interested in the topic of economic growth and its causes since Smith (1776) and Ricardo (1911). According to Solow (1956) the neo-classical model offers the essential framework for estimating growth, but it has disregarded the part that human capital plays in determining economic growth.

Since the middle of the 1980s, one of the most significant areas of economic research has been the examination of the factors that influence economic growth. Romer (1990) examination of the endogenous growth literature served as a catalyst for this area of study.

Furthermore, the growth-empirics strategy, which started with the neoclassical convergence hypothesis being tested, made a significant contribution (Mankiw, Romer, & Weil, 1992).

The compilation of comparable cross-country statistics on GDP, productivity, and human capital indicators is another significant accomplishment that must be emphasized (Heston, 1988).

Benhabib and Spiegel (1994) use a dataset from the summers to examine the function of human capital in the context of exogenous and endogenous growth theories. Mankiw et al. (1992) use growth models that include human capital to get around this.

Using a cross-national data set, Benhabib and Spiegel (1994) discover that physical and human capital have a positive impact on economic growth.

Levine (1997) argues that countries with higher secondary school enrollment rates expand more rapidly than countries with lower secondary school enrollment rates.

Jaoul* (2004) investigated the connection between economic growth and education in Germany and France during the period of World War II. He discovered that, although education had no discernible impact on Germany's economic growth, it did have an impact on France's GDP.

A study by Nadiri (1972) of some developing countries indicates that education contributes 16% of economic growth in Argentina and 0.8% in Mexico. According to the methodology of Schultz (1960) this contribution is 23% in Ghana and 16% in Nigeria.

However, in their sample of nations, Gallup, Sachs, and Warner (1995) could not discover a statistically significant correlation between early educational achievement and subsequent economic growth in their sample of nations. They used the average number of years of education for adults as their main indicator of education, which they borrowed from Barro and Lee (2001).

By using the expanded Solow growth model, Mankiw et al. (1992) discovered a positive correlation between economic growth and education.

Collins (2003) states that most of the variance in the empirical results obtained, measurement problems, and the inclusion of additional explanatory variables regarding the effects of education on growth can be attributed to differences in definitions or the sample of countries observed, and the time periods covered. They also highlight irrational expectations since the average number of years of education changes very slowly, it can be difficult to see how it affects output in cross-country data. They conclude that only when the quality of government institutions is excluded as a control is there a positive and significant relationship between higher output per worker and the quality of education.

Dinawi, Zrouat, and Talha (2021) study, which used the ARDL model to analyze the relationship between government spending on education and economic growth in Algeria for the 1990–2019 period, revealed a negative inverse relationship between the two in both the short and long terms, which is contrary to economic theory.

Mushtaq and Khan (2012) investigate how Pakistan's economic growth from 1971 to 2008 was influenced by education. According to the study's findings, secondary education makes a substantial contribution to Pakistan's real GDP per person. Economic growth is positively impacted by primary education as well, although the relationship is not statistically significant. The findings of the cointegration test verified that

there is a long-term correlation between real GDP per capita and education. Therefore, it is recommended that in order to achieve continuous economic growth, education remain a top priority in governmental policies, that primary education be made universal, and that the dropout rate at all educational levels be discouraged. Either through higher education or secondary school. The majority of research on how education affects development has concentrated on how education affects growth and has used cross-country data.

Others look into how education affects income growth using cross-state data within a nation or time series data. According to these studies, education significantly and favorably affects the rate of income increase (Baldwin & Borrelli, 2008).

3. Methodology

The study intends to investigate the connection between Lebanon's economic growth and government spending on education. Therefore, annual time series data extending from 1993 to 2023 were used, and the data were mainly obtained from the World Bank (2024).

Since the study seeks to study the relationship between economic variables, the Stata program was used in a way that allows formulating equations and estimating results accurately.

These variables are: GDPPC: GDP Per Capita (Constant 2015 $); ENROL: Number of Secondary Enrollment; EDUCEXP: Government Expenditure on Education (%); TLE: Total Labour Force Participation; FBCF: Gross Fixed Capital Formation.

The software used to perform the statistical tests is: Stata.

3.1. Method

The significance of government spending as a catalyst for sustained economic growth was emphasized by the Keynesian theory of economic growth (Keynes, 1936 cited in Meltzer (1981)). According to the Keynesian paradigm, increasing government spending promotes sustainable economic growth. The following is the study model.

$$Y = f(ENROL, EDUCEXP, TLF, FBCF) \quad (1)$$

where Y is GDP per capita; The model function's explicit version looks like this:

$$Y = \beta_0 + \beta_1 ENROL + \beta_2 EDUCEXP + \beta_3 TLF + \beta_4 FBCF + \mu \quad (2)$$

μ: The random disturbance term.

The model is presented in a non-linear form in (2), hence in (3) the model is linearized to allow for estimate in the manner described below.

$$Yt = \beta_0 + \beta_1 ENROLt + \beta_2 EDUCEXPt + \beta_3 TLFt + \beta_4 FBCFt + \mu \quad (3)$$

All variables are subjected to the natural logarithm, and the model equation, assuming that the variables are linear, yields.

$$LnYt = \beta_0 + \beta_1 LnENROLt + \beta_2 LnEDUCEXPt + \beta_3 LnTLFt + \beta_4 LnFBCFt + \mu \quad (4)$$

In this study, the ARDL test is used as a more accurate and efficient estimation method. This method was mentioned by Pesaran and Shin (1995). They introduced Autoregressive Distributed Lag (ARDL), a cointegration method for the frontier technique for long-run relationships, especially when the presence of a single cointegration vector (Johansen integration) cannot be utilized, ignoring the degree of stationarity. Moreover, the short- and long-run relationship specifications of the model variables are provided by the results of the ARDL parameters.

3.2. Econometric Model

3.2.1. Stationarity – Unit Test

Cointegration analysis is incorrect when variables of different orders are integrated, as demonstrated by Granger (1981) and Engle and Granger (1987). Johansen and Juselius (1990) demonstrated that the ARDL cointegration approach is appropriate to prevent the collapse of the ARDL model when an integrated random trend of I(2) is present. The stationarity criterion of all series must be checked as a first step in estimating the model, even if the ARDL cointegration technique does not require a priori testing for unit roots. Stationarity is the state in which the series' mean, variance, and structure don't change over time.

A stochastic process having unit roots or structural breaks is referred to as a non-stationary time series in the context of the unit root concept. Nonetheless, one of the main causes of non-stationarity is unit roots.

Table 1. Unit root tests on the individual series: ADF (Dickey-Fuller Test) and PP (Phillips–Perron Test) without a constant test.

Variable	Series						Series in first difference					
	Test-statistic	Dickey-Fuller critical value (5%)	P-value	Test-statistic	Phillips–Perron critical value (5%)	P-value	Test-statistic	Dickey-Fuller critical value (5%)	P-value	Test-statistic	Phillips–Perron critical value (5%)	P-value
GDP per capita (Constant 2015 $)	-1.967	-3.584	0.6192	-0.950	-3.584	0.9505	-3.253	-3.588	0.0744*	-3.142	-3.584	0.0966*
Number of secondary enrollment	-3.695	-3.584	0.0227**	-3.233	-3.584	0.0780*	-3.460	-3.588	0.0439**	-5.981	-3.584	0.0000***
Government expenditure on education (%)	-3.058	-3.584	0.1165	-3.560	-3.584	0.0334**	-4.195	-3.588	0.0045***	-8.453	-3.584	0.0000***
Total labour force participation	-1.711	-3.584	0.7461	-0.833	-3.584	0.9628	-2.721	-3.588	0.2276	-3.218	-3.584	0.0809*
Gross fixed capital formation	-1.436	-3.584	0.8499	-2.299	-3.584	0.4346	-2.106	-3.588	0.5429	-4.950	-3.584	0.003***

Note: *, ** and *** mean respectively that the coefficient is significant at the 10%, 5% and 1% threshold.
series are expressed in logarithmic.

Source: Table made by the author using results Stata software.

Table 1 indicates that the variables are not stationary at level according to the Augmented Dickey-Fuller and Phillips-Perron tests expect for the secondary enrollment and Government expenditure at the 5% levels. Variables show different levels of stationarity at first level according to Augmented Dickey-Fuller and Phillips-Perron Tests however, it is clear that there is no integration between the specified variables.

Table 2. Maximum number of lags.

Sample:	1997 thru 2023						Nb of obs. = 27	
Lag	**LL**	**LR**	**Df**	**P**	**FPE**	**AIC**	**HQIC**	**SBIC**
0	62.041				0	-4.225	-4.154	-3.985
1	152.201	180.320	25	0.000	0	-9.052	-8.624	-7.612
2	205.623	106.840	25	0.000	0	-11.157	-10.372	-8.518
3	266.163	121.080	25	0.000	0	-13.790	-12.648	-9.950
4	332.788	133.25*	25	0.000	0*	-16.873*	-15.375*	-11.834*

Note: * mean respectively that the coefficient is significant at the 10% threshold.
series are expressed in logarithmic.
Source: Table made by the author using results Stata software.

Table 2 indicates that the maximum lag that can be applied using the Schwartz Information Criterion (SBIC), Hannan-Quinn Information Criterion (HQIC), Akaike Information Criterion (AIC), and Final Prediction Error (FPE). It considers that the optimal lag is 4 (4.4e-13 for FPE; -16.8732 for AIC; -15.3747 for HQIC; -11.8338 for SBIC).

Table 3. ARDL (2,1,2,2,2) model.

Model NO of obs. = 29 F(13,15) = 63.34 Prob > F = 0.0000 R2 =0.9821 Adj R2 =0.9666 Root MSE = 0.0283

Sample: 1995 thru 2023

Log likelihood = 71.824356

LGDPPC | Coefficient		Std. err.	T	P>|t|	[95% conf. interval]	
LGDPPC |						
L1.	1.179	0.157	7.500	0.000	0.844	1.514
L2.	-0.299	0.207	-1.440	0.170	-0.740	0.142
LENROL |						
--.	0.210	0.198	1.060	0.305	-0.212	0.632
L1.	-0.474	0.169	-2.810	0.013	-0.834	-0.114
LEDUCEXP |						
--.	-0.048	0.046	-1.040	0.315	-0.147	0.051
L1.	-0.220	0.045	-4.930	0.000	-0.314	-0.125
L2.	0.099	0.040	2.450	0.027	0.013	0.184
LFBCF |						
--.	-.001	0.011	-0.090	0.927	-0.024	0.022
L1.	0.104	0.030	3.43	0.004	0.039	0.169
L2.	-0.236	0.063	-3.72	0.002	-0.371	-0.101
LTLF |						
--.	0.665	0.256	2.60	0.020	0.121	1.211
L1.	-1.087	0.364	-2.99	0.009	-1.862	-0.312
L2.	0.719	0.212	3.40	0.004	0.268	1.171
_cons |	3.542	2.166	1.64	0.123	-1.075	8.159

Source: Table made by the author using results Stata software.

The speed of adjustment is shown by a negative number (-0.2986452) for ln GDP in Table 3. This result confirms how well the dependent variable responds to the equilibrium relationship's departure over a single period or how quickly equilibrium distortion occurs. Therefore, the long-run coefficients in Table 4's second section demonstrate that while government spending has a negative impact on economic sustainability, education spending and student enrollment have a favorable impact. Connolly and Li (2016); Chen, Pinar, and Stengos (2020) and Taher (2019) all corroborate this conclusion. The short-run connection does, however, provide two positive coefficients (0.0985691; 0.7198382). This indicates that, independent of the long-term equilibrium deviation, it takes short-term changes into consideration.

Table 4. Bound test.

Sample: 1995	thru 2023	NO of obs =29	R^2=0.8890	Adj R^2 = 0.7928	Root MSE=0.0283
Log likelihood = 71.824356					

D.LGDPPC	Coefficient	Std. err.	T	P>|t|	[95% conf.	interval]
LGDPPC |						
L1.	-0.120	0.133	-0.900	0.383	-0.405	0.164
LENROL	-2.194	3.602	-0.610	0.552	-9.872	5.484
LEDUCEXP |	-1.408	1.643	-0.860	0.405	-4.910	2.094
LFBCF	-1.107	1.474	-0.750	0.465	-4.249	2.036
LTLF	2.484	2.481	1.000	0.333	-2.805	7.773
LGDPPC |						
LD.	0.299	0.207	1.44	0.170	-0.142	0.740
LENROL |						
D1.	0.474	0.169	2.810	0.013	0.114	0.834
LEDUCEXP |						
D1.	0.121	0.056	2.160	0.048	0.002	0.240
LD.	-0.099	0.040	-2.450	0.027	-0.184	-0.013
LFBCF |						
D1.	0.132	0.037	3.570	0.003	0.053	0.211
LD.	0.236	0.063	3.720	0.002	0.101	0.371
LTLF |						
D1.	0.367	0.229	1.600	0.131	-0.123	0.857
LD.	-0.719	0.212	-3.400	0.004	-1.171	-0.268
_cons	3.542	2.166	1.64	0.123	-1.075	8.159

Note: Estat ectest is now the primary method for testing for a levels relationship, replacing estat btest.
Source: Table made by the author using results Stata software.

Table 5. Pesaran, Shin, and Smith (2001) bounds test.

H0: no Level relationship F = 9.336 t = -0.900

Finite sample (4 variables, 29 observations, 8 short-run coefficients) Kripfganz and Schneider (2020) critical values and approximate p-values

	10%		5%		1%		p-value	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F	2.748	4.246	3.447	5.213	5.269	7.709	0.001	0.004
t	-2.467	-3.607	-2.876	-4.098	-3.742	-5.142	0.619	0.853

Don't reject H0

Critical values for I (0) variables are reached if F or t is nearer to zero.
(if the p-value for the I (0) variables > the acceptable level)

Reject H0 If
The value of F and t > the critical values for I(1) variables

(If both of the I (1) variables' p-values are below the acceptable level)
At levels: No rejection (A), Inconclusive (.), or rejection (R)

Note:

	10%	5%	1%
		.a	.a

Source: Table made by the author using results Stata software.

Table 5 data show that the F-statistic is 9.366—larger than the F critical values of 1%, 5%, and 10%. The null hypothesis is thus rejected by the test (Kripfganz & Schneider, 2020). This suggests a long-term link between the independent and dependent variables.

3.2.2. Diagnostic Tests of the Model

Some econometric tests, such as examining autocorrelation, heteroscedasticity, and stability tests, are crucial for diagnosing the model.

1- Autocorrelation Tests

Durbin–Watson d-statistic (14, 29) =2.471281.

Table 6 presents the error autocorrelation test using Breusch-Godfery LM test.

Table 6. Error autocorrelation test using Breusch-Godfery LM test.

Breusch–Godfrey LM test				
lags(p)	**|**	**chi2**	**Df**	**Prob > chi2**
	+			
4	|	6.659	4	0.1550

Source: Table made by the author using results Stata software.

p-value = 0.209 > 0.05.

H₀: No serial correlation.

Since there is non autocorrelation.

2 -Hetroscedasticity Test

H₀: Homoskedasticity.

Ha: Heteroskedasticity without restrictions.

chi2(28) = 29.00.

Prob > chi2 = 0.4125.

Table 7. Hetroscedasticity test.

Cameron & Trivedi's decomposition of IM-test			
Source |	**chi2**	**Df**	**P**
----------+	----------		
Heteroskedasticity |	----29.00	28	0.4125
Skewness |	7.24	13	0.8894
Kurtosis |	0.05	1	0.8186
----------+	----------		
Total |	----36.29	42	0.7190

Source: Table made by the author using results Stata software.

The hull hypothesis is rejected since the critical value in Table 7 is higher than the threshold p-value of 0.05. Since there is no heteroscedasticity, the calculated model residuals are dispersed randomly.

3-Stability Test

Before creating a forecast, a further stage in the estimation process is to verify the model's sufficiency. This process is broken down into two parts: evaluating the model's stability and assessing the residuals' performance.

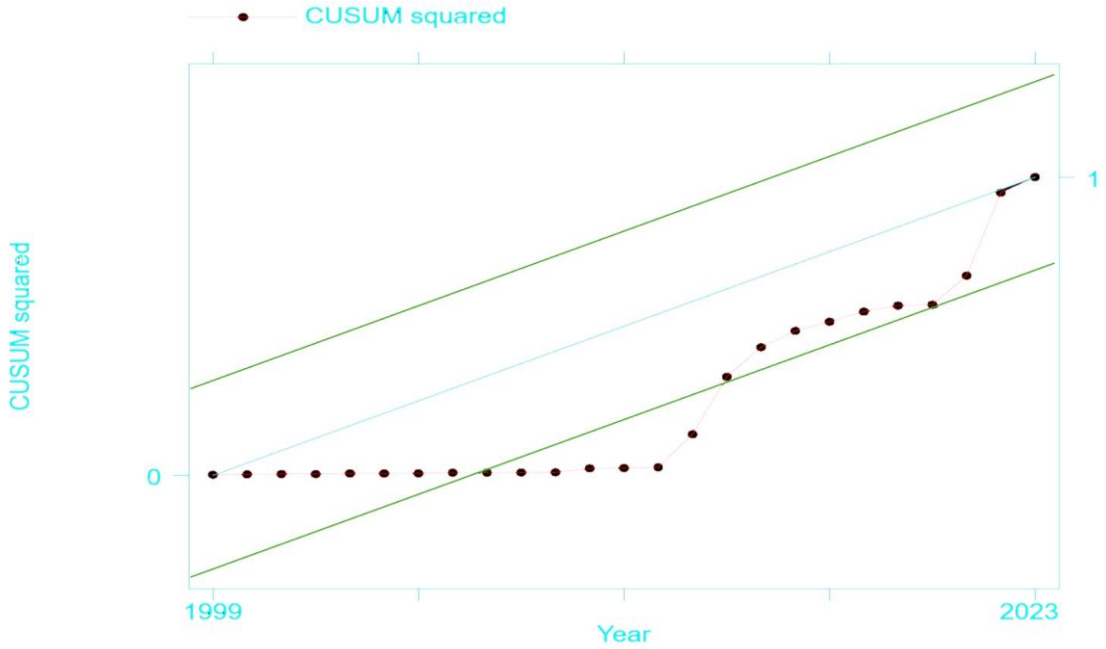

Figure 1. CUSUM Stability test of ARDL (2,1,2,2,2) model.

Source: Figure made by the author using results Stata software.

CUSUM is used to verify the accuracy and stability of the calculated model.

The model is unstable between 2008 and 2013, as seen in Figure 1.

4. Discussion

Most economic studies and theories suggest that education spending has a positive impact on economic growth. For instance, Chang, Xu, Sun, and Khan (2021) argue that public investment in research and development is essential for sustaining long-term economic progress. Likewise, Mankiw et al. (1992) highlight a positive relationship between education and economic growth. In the case of Pakistan, Mushtaq and Khan (2012) using the extended Solow growth model, find that secondary education significantly enhances real GDP per capita.

In contrast, the findings of the current study reveal a long-run relationship among the tested variables but indicate a negative effect of government spending on education on economic growth. These results are in line with Dinawi et al. (2021) who found similar outcomes in Algeria using the ARDL model for the period 1990–2019. However, they stand in contradiction to Keynesian economic theory, which maintains that government expenditure positively influences economic growth (Keynes, 1936, as cited in Meltzer (1981)).

5. Conclusion and Recommendation

This study examined the impact of government spending on economic growth and education in Lebanon over the period 1993 to 2023. The analysis began with stationarity testing using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. The results revealed that, with the exception of government spending and secondary school enrolment, which were stationary at the 5% significance level, all other variables were non-stationary at level.

Using the Autoregressive Distributed Lag (ARDL) estimation technique, the study found that government spending on education exerts a negative effect on economic growth. This outcome contradicts the majority of economic theories, which generally argue that investment in education positively contributes to economic performance.Therefore, based on these results, the Lebanese government should continue spending on education services, but this must be done in the right way. Education in Lebanon needs radical reforms and addressing the gaps and problems it suffers from, most notably the rampant corruption in many of its sectors. The state must work to develop and improve the performance of the education sector as much as possible to keep pace with global developments, such as working on updating curricula to meet the needs of the modern economy, with a focus on enhancing technical and vocational education to address skills gaps and enhance employability, and ensuring that funds are used for their designated purposes and punishing any misuse. Any government spending on education, no matter how small, in light of this corruption and lack of transparency will be of no benefit. The state has spent huge sums on this sector over time, and a large part of this money was not spent properly and did not achieve any benefit. The main reason for this is the absence of the required reforms from the state. The Lebanese government's spending on education after implementing these reforms will have positive effects on this sector and help develop it, which will positively reflect on economic growth.

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