

The Impact Of Government Spending On Economic Growth An Econometric study Of The Case Of ALGERIA During The Period (1985-2022)

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Abstract: This research investigates the connection between government expenditure and economic growth in Algeria, focusing on both theoretical and empirical aspects. It examines the nature of this relationship within the framework of government spending, with particular attention to the impact of management and equipment expenditures on economic growth. The significance of the research lies in its assessment of how variations in these key components of government spending influence economic performance. On the empirical front, the study applies the Autoregressive Distributed Lag (ARDL) model, utilizing annual data spanning from 1985 to 2022. The findings from the long-term model estimation indicate a significant and robust relationship between equipment and management expenditures, reflecting the underlying economic conditions. Furthermore, the ARDL model results demonstrate that deviations from the long-term equilibrium are corrected at a rate of 14.07% annually, providing insight into the adjustment dynamics of the Algerian economy.

Keywords: Government spending, economic growth, autoregressive distributed time lag model.

Jel Classification Codes: H50, O40, O47, C2.

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Introduction

Government spending has become a topic of significant importance worldwide, as it serves as a fundamental pillar and key instrument in the economy that governments rely on to promote and stimulate economic growth, driving development forward.

It is rooted in government expenditure across various social and economic sectors, including infrastructure, healthcare, and education, plays a pivotal role in stimulating aggregate demand. This expenditure influences economic activity through both direct and indirect channels, potentially leading to an increase in consumption, investment, and aggregate demand, which contributes to long-term productivity growth. The Algerian economy experienced significant turbulence and critical challenges during the 1980s and 1990s, which led to a marked decline in economic growth. In response, the Algerian government sought to revitalize the economy and promote sustainable economic growth by implementing a range of strategies and policies, with government spending playing a central role in these efforts.

The study problem: The Algerian economy is classified as a predominantly rentier economy, characterized by its fragility outside the hydrocarbon sector and its continued reliance on oil. To address this issue, the government aims to reduce this dependency by adopting policies and strategies designed to transition away from oil reliance, including carefully planned and strategic spending.

Building on the previous analysis, this study aims to explore the core research question: How has the connection between government expenditure and economic growth in Algeria evolved during the period from 1985 to 2022?

Based on the study's primary research question, the following sub-questions are proposed:

- How does the interaction between management expenses and economic growth in Algeria manifest during the period 1985-2022?

- How does the connection between equipment expenses and economic growth in Algeria evolve during the period 1985-2022?

To answer the questions posed, the following hypotheses must be addressed:

- There is a direct interaction between management expenses and economic growth in Algeria during the period (1985-2022).
- There is a direct connection between equipment expenses and economic growth in Algeria during the period (1985-2022).

Study methodology: The research employed a descriptive-analytical and experimental approach. The descriptive method was utilized to define the concepts of government spending and economic growth, while the analytical method was applied to examine the development of government spending in Algeria, focusing on management and equipment expenses. Additionally, the experimental method was used to explore the connection between government spending and economic growth, employing econometric techniques where applicable.

Study Structure:

First: Theoretical exploration of government spending and economic growth in Algeria from 1985 to 2022.

Second: An econometric investigation into the interaction between government expenditure and economic growth in Algeria from 1985 to 2022.

Study objective: This study aims to critically examine the effects of government fiscal policies on the trajectory of economic growth in Algeria across the period 1985 to 2022.

Previous studies: To discuss and analyze the research problem, the following previous study was referenced:

- **Smaili and Khelassi (2021):** conducted a study to analyze the association between public expenditures and Algeria's Gross Domestic Product (GDP) over the period from 1990 to 2019. Employing the ARDL methodology, their findings indicate a long-term equilibrium relationship between public expenditures and GDP, underscoring the reliance of Algerian financial policy on oil revenues to sustain public spending.

- **Guennouni and Ameur (2020):** This study examined public investment spending as a crucial economic determinant of growth, analyzing the impact of macroeconomic variables on public investment in Algeria from 1990 to 2018. The findings were consistent with economic theories, both in the short and medium term.

- **Mohammed Alqadi and Suraya Ismail (2019):** This research article provides a comprehensive review of the theoretical literature concerning the nexus between government spending and economic growth. It critically examines the definitive relationship between these variables through the perspectives of six distinct schools of thought. The study concludes that both theoretical and empirical investigations yield inconclusive results, attributable to a range of factors including varying levels of development, differences in the selected sample of countries, disparate time periods, and methodological approaches.

- **Merim and Djebar (2019):** This study investigated the causal relationship between government spending and economic growth in Algeria for the period 2000-2016. The findings revealed that public spending is increasing at a faster rate than GDP growth, suggesting that individual spending serves as an indicator of economic growth in Algeria.

- **Nouira.R and Kouni.M (2018):** This study utilized the Autoregressive Distributed Lag (ARDL) methodology to analyze data spanning from 1988 to 2016, encompassing 36 countries, which include 21 developing nations and 15 Middle Eastern countries. The primary objective was to examine the causal connection between government expenditure and economic growth. The findings revealed a linear connection between these variables, with government spending explaining approximately 10% to 30% of the variation in economic growth across the sampled countries.

I. Theoretical framework regarding government spending and economic growth in Algeria from 1985 to 2022.

I. 1. Government spending.

In Algeria, government expenditure has emerged as a critical component of the economic framework, driven by efforts to mitigate reliance on the hydrocarbon sector. This analysis will evaluate the current state of government spending in Algeria by examining available data and highlighting key expenditure areas. According to Hutagalung and Siahaan (2020), government spending is a fundamental component of fiscal policy. It outlines the methods and strategies employed by governments to manage economic activities, regulate operations, and balance revenues and expenditures annually. This strategy is designed to ensure price stability and employment growth, aligned with production levels, in order to stimulate economic development (Haya Farras Shalihah & Febriani, 2023).

I. 2. Economic growth

Economic growth is characterized by an expansion in national income per capita, which directly results from increases in Gross National Product (GNP) or Gross Domestic Product (GDP), thereby contributing to a rise in national wealth. This growth contributes to an improvement in individuals' standard of living and enhances purchasing power. In essence, economic growth signifies an upward trend in the macroeconomic indicators of national economies, whether linear or nonlinear, with significant effects on various sectors, including economic, political, and social domains. This process, often referred to as development, illustrates the progressive relationship of societies and the extent to which their standard of living has improved. (HALLER, 2012)

Where growth was defined according to (Simon Kuznets) as the increase that is on the long-term level or long-term for a country, with the presentation of a different group of economic goods increasingly to its population, and that this increase in capacity is related to both the development of technology and the institutional ideological modifications that it needs. (Kuznets, Jun 1973) P. Samuelson defines economic growth as the overall augmentation of Gross Domestic Product (GDP) or Gross National Product (GNP) that is projected to result from the full and efficient deployment of available resources. (mekid ali, 2013) . It can also be said that it is the continuous increase over time in goods and services with a development in the labor force rate. Including the increasing rise in individual income with a decrease in the volume of work hours and maintaining the same level of wealth.(David de la Croix.2015)

I.3 Analysis of the interaction between government spending and economic growth in Algeria: An examination of the period 1985-2022

Prior to examining the relationship in the context of Algeria, it is essential to review prior studies addressing this subject and their findings. This review will be framed within the Ricardian school of thought, particularly focusing on the equivalence hypotheses, which analyze the effects of government spending irrespective of whether it is financed through public debt or taxation.. Economic growth in countries can be characterized as neutral, indicating that there is no significant relationship between government spending and growth. This lack of effect is primarily attributed to consumer expectations regarding tax changes. Specifically, higher taxes tend to lead to increased savings and reduced consumption, while lower taxes have the opposite effect. (Ismail·2019)

Most studies divided government spending into two parts: productive spending and unproductive spending, which shows us that productive spending has a direct impact on growth, while the other type, which is unproductive, has an indirect impact or may not have any impact at all. Research on this topic has yielded varied results, with the predominant conclusion indicating that government consumer expenditure adversely affects economic growth (Grier and Tullock, 1989; Barro, 1991; Easterly and Rebelo, 1993; Tanninen, 1999). Certain studies further suggest that while government spending may impede economic growth, exceptions occur when expenditures are allocated to the education sector, where they may potentially support the growth process. (Kweka & Morrissey, 2000)

To analyze this relationship, it is essential to examine the trends in government spending and economic growth in Algeria from 1985 to 2022. This analysis is illustrated in the following table:

Table (1): Trends in Government Spending and Economic Growth in Algeria from 1985 to 2022

EE	ME	GE	GDP	ANN	EE	ME	GE	GDP	Year
638036	1250894	1888930	1,2692E+13	2004	45181	54660	99841	8,3723E+12	1985
806905	1245132	2052037	1,3441E+13	2005	40663	61154	101817	8,4058E+12	1986
1015144	1437870	2453014	1,367E+13	2006	40216	63761	103977	8,347E+12	1987
1434638	1674031	3108669	1,4135E+13	2007	43500	76200	119700	8,2635E+12	1988
1973278	2217775	4191053	1,4474E+13	2008	44300	80200	124500	8,6271E+12	1989
1946311	2300023	4246334	1,4705E+13	2009	47700	88800	136500	8,6961E+12	1990
1807862	2659078	4466940	1,5235E+13	2010	58300	153800	212100	8,5918E+12	1991
1974363	3879206	5853569	1,5677E+13	2011	144000	276131	420131	8,7464E+12	1992
2275539	4782634	7058173	1,621E+13	2012	185210	291417	476627	8,5627E+12	1993
1892595	4131536	6024131	1,6663E+13	2013	235926	330403	566329	8,4857E+12	1994
2501442	4494327	6995769	1,7297E+13	2014	285923	473694	759617	8,8081E+12	1995
2039322	4617009	7656331	1,7937E+13	2015	174013	550596	724609	9,1693E+12	1996
2711930	4585564	7297494	1,8511E+13	2016	201641	643555	845196	9,2701E+12	1997
2605448	4677182	7282630	1,8751E+13	2017	211884	663855	875739	9,7429E+12	1998
2918387	4813683	7732070	1,8976E+13	2018	186987	774695	961682	1,0055E+13	1999
2846109	4895236	7741345	1,9166E+13	2019	321929	856193	1178122	1,0437E+13	2000
2940190	4863850	7804040	1,8189E+13	2020	357395	963633	1321028	1,075E+13	2001
2970230	4922780	7893010	1,8807E+13	2021	452930	1097716	1550646	1,1352E+13	2002
3546900,17	6311532,44	9858432,61	1,9409E+13	2022	516504	1122761	1639265	1,2169E+13	2003

Source: Prepared by researchers based on data from the International Monetary Fund and the Ministry of Finance.

These symbols represent:

GDP: gross domestic product

GE: Government expenditure

ME: Management expenses

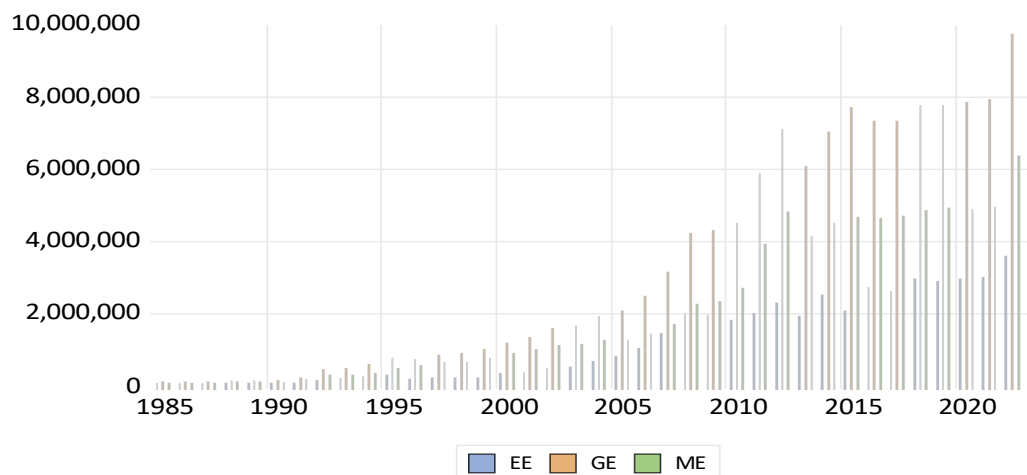
EE: Equipment expenses (final contributions)

I.4 Development of government spending during the period (1985-2022):

We will notice from the following figure that government spending in general and management and equipment expenses in particular have increased.

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Figure (1): represents the development of government spending in Algeria from 1985 to 2022.



Source:Compiled by the researchers based on Eviews 13 outputs

It is clear to us from the previous figure that government spending during the eighties and nineties was very low in value, as it rose by a weak amount from 99,841 million DZD in 1985 to reach 961,682 million DZD in 1999. This increase is considered relatively minor when contrasted with the broader growth period, largely due to the economic crises and adverse conditions between 1985 and 1991, which resulted in a significant drop in oil prices. In the mid-1980s, Algeria encountered a pronounced decrease in oil prices, which directly reduced national revenues. Given Algeria's heavy reliance on oil revenue, this decline had a detrimental effect on the state budget. The reason that made the government resort to reducing spending on many development projects and the deterioration of infrastructure...etc. As for the period (1991-1999), Algeria faced a security and political crisis that was called the Black Decade. Government spending directly increased on security and defense to confront these challenges, which threatened the life of the citizen. Due to the conditions witnessed during this turbulent period, foreign investments declined.

During the 2000s, it witnessed remarkable development, rising from 1,178,122 million DZD in 2000 to 7,058,173 million DZD in 2012. This increase is attributed to the rise in state revenues resulting from higher oil prices in global markets. This revenue surge enabled the government to implement extensive development plans focused on enhancing infrastructure and public services. Implementing programs that provide job opportunities to reduce unemployment rates by supporting small and medium enterprises, in addition to structural reforms related to spending on education, training and technology to enhance and stimulate the competitiveness of the economy by increasing government spending. In 2013, government expenditure fell to 6,024,131 million DZD, a reduction attributed to the decline in global oil prices, which consequently impacted state revenues, as previously discussed. And as a result of the decline in revenues, an austerity policy was resorted to to control the deficit. The economic reforms that led Algeria to try to diversify sources of income and move away from oil dependency, which made it reduce and rationalize expenditures.

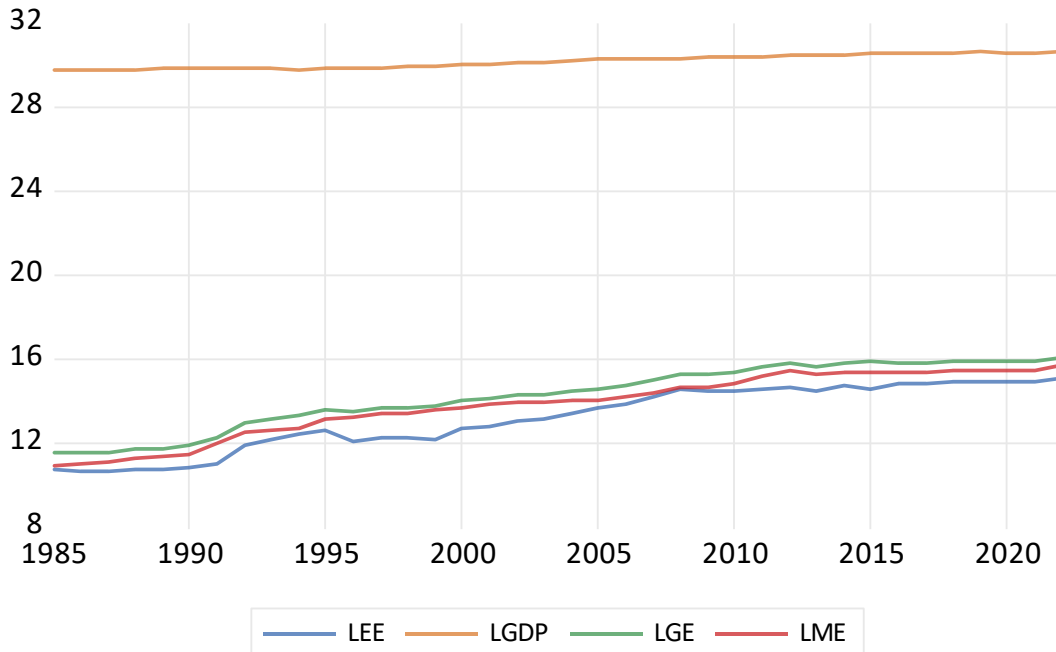
From 2014 to 2022, government expenditure rose from 6,995,769 million DZD to 9,858,432.61 million DZD. This period was marked by instability due to factors such as the drop in oil prices in 2014, the 2019 popular protests, and the COVID-19 pandemic. In response to these

challenges, economic reform programs were launched to diversify the economy and reduce reliance on oil, emphasizing the development of the industrial and agricultural sectors.

I.5 The Interplay Between Government Expenditure and Economic Growth:

The following figure depicts the relationship between government expenditure and economic growth.

Figure (2):The dynamics between government spending and economic growth (GDP) in Algeria: An Analysis from 1985 to 2022



Source: Compiled by the researchers based on data from Eviews 13

LGDP, LGE, LME, LEE represent the logarithm of GDP, government expenditure, management expenses, and equipment expenses. In order to reduce variances and interpret the transactions as elasticities, The logarithmic model was chosen as follows:

$$GDP = c + b_1 LME + b_2 LEE + \varepsilon_t \dots \dots \dots$$

We notice from Figure 02 that government spending positively affects the GDP, meaning that there is a direct relationship between government spending (management expenses and equipment expenses) and economic growth (GDP), because the more government spending increases, the greater the economic growth, and this is explained by the increase in aggregate demand. Direct stimulation of demand through spending on projects such as infrastructure (building roads, bridges...) It leads to an increase in demand for building materials, labor...etc. It increases and stimulates the incomes of individuals and companies. In turn, it enhances consumption and investment in the private sector, i.e. an increase Government spending stimulates economic activity.

II. Econometric analysis of the relationship between government spending and economic growth in Algeria: 1985-2022

II.1 Study variables: To evaluate the effect of government expenditure on economic growth in Algeria from 1985 to 2022, we employed annual data for three variables obtained from two primary sources: the National Bureau of Statistics and the Ministry of Finance, along with the World Bank. The data, expressed in millions of **DZD**, include:

Dependent variable: Gross Domestic Product (**GDP**).

Independent variables: management expenses, symbolized by (**ME**), and equipment expenses (final expenses), symbolized by (**EE**).

The logarithm was entered for all variables.

II.2 Unit root test (time series stability): Prior to the estimation of the model, it is essential to conduct a stability assessment of the time series data for the study's variables. This assessment is critical for selecting the appropriate methodological approach, as it involves testing for stationarity. The unit root test is a widely recognized and integral procedure in empirical research, often implemented through standard analytical software packages. (attia, 2005)

Going beyond this stage, which constitutes the initial phase of a standard analysis, may result in unreliable outcomes. Therefore, we will employ the Phillips-Perron (PP) test to assess the presence of unit roots.

Table 2: Displays the results of the Phillips-Perron (PP) unit root test.

integral	Unit Root Test (PP)						V
	1er différences			Level			
	None	Constant & Trend	Constant	None	Constant & Trend	Constant	
I(1)	-2.6207 (0.0103)	-4.2822 (0.0089)	-4.2942 (0.0017)	4.0639 (1.0000)	-2.2305 (0.4596)	0.1483 (0.9653)	LGDP
I(1)	-2.6875 (0.0086)	-4.5248 (0.0048)	-4.3215 (0.0016)	3.8571 (0.9999)	-0.9557 (0.9381)	-2.1079 (0.2428)	LME
I(1)	-4.9102 (0.0000)	-5.9535 (0.0001)	-5.8957 (0.0000)	2.7682 (0.9981)	-1.8752 (0.6470)	-0.9858 (0.7483)	LEE

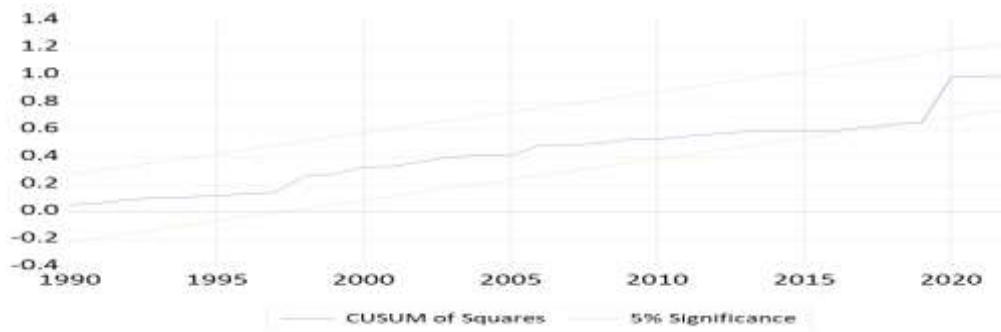
Source: Compiled by the researchers utilizing data from EViews 13.

The preceding table demonstrates that all study variables exhibit significance at the first difference across different conditions: with a constant and a general trend, with a constant alone, and without either a constant or a general trend. The model incorporating both a constant and a general trend is preferred, indicating that all study variables are stationary at the first difference when both components are considered.

Consequently, the ARDL methodology is suitable for application due to its advantageous characteristics, including its capacity to manage variables with varying degrees of integration, whether at the level or first difference. This approach effectively accommodates differences in variable stationarity, permitting the inclusion of variables with non-uniform stability.

II.3 Model Estimation: Upon estimating the initial model, the resulting metrics indicated the presence of common issues, suggesting that the model exhibits structural instability.

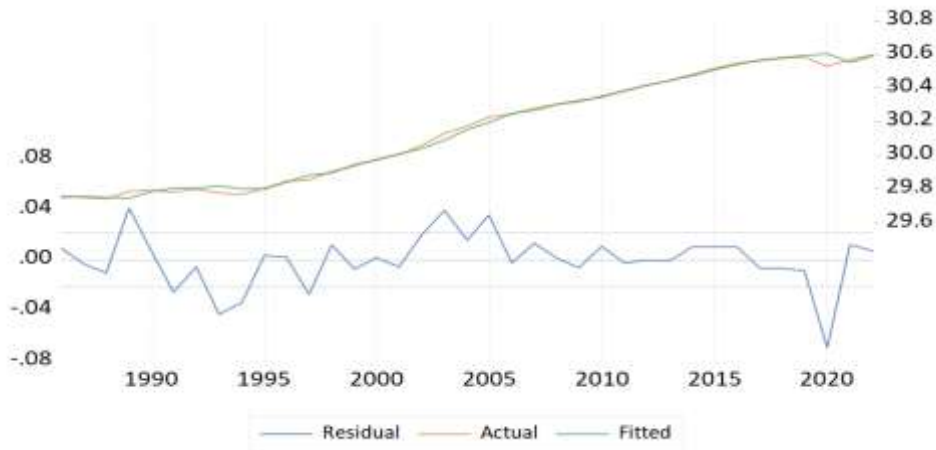
Figure (3):Presents the cumulative sum of squared residuals



Source: Compiled by the researchers utilizing data from EViews 13.

From the previous figure, it is observed that the curve, prior to the 2020 period, fell outside the 5% confidence interval.

Figure(4):Presents the residual plot of the model.



Source:Compiled by the researchers based on data from Eviews 13.

The figure indicates that the residual plot deviates from zero in certain years.

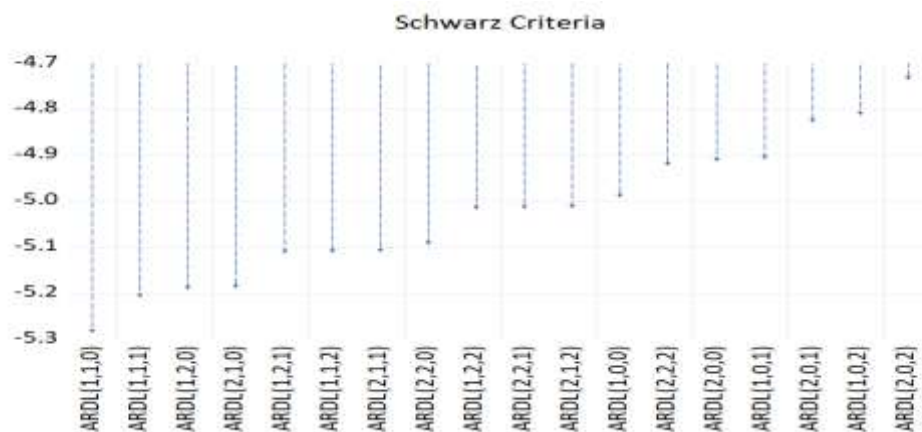
From the previous two figures, we conclude that the model contains standard problems, and in order to improve this model, we enter dummy variables during the years 1993, 1994, 1997, 2009, and 2020.

II.3.1 Determination of gaps and slowdown periods:

The number of gaps and slowdown periods for the model is established using time-lag selection criteria, including the Schwarz Information Criterion (SC) (Eviews 9 User's Guide II). The results are illustrated in the following figure:

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Figure(5):Represents specifying the number of gaps and slowdown periods



Source:Compiled by the researchers based on data from Eviews 13.

Based on the Schwarz Criterion (SC) test, the model with the lowest Schwarz criterion value is selected, which in this case is the (1,1,0) model.

II.3.2 Estimation of the overall model equations:

- **General standard equation:**

Estimation Command:

=====

ARDL(DEPLAGS=2, REGLAGS=2) LGDP LME LEE @ D_1993 D_1994 D_1997 D_2009 D_2020

Estimation Equation:

=====

$LGDP = C(1)*LGDP(-1) + C(2)*LME + C(3)*LME(-1) + C(4)*LEE + C(5)*D_{1993} + C(6)*D_{1994} + C(7)*D_{1997} + C(8)*D_{2009} + C(9)*D_{2020} + C(10)$

Substituted Coefficients:

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$LGDP = 0.85923331588*LGDP(-1) - 0.0452277420961*LME + 0.0564743542537*LME(-1) + 0.018515032612*LEE - 0.067050782437*D_{1993} - 0.0597007135231*D_{1994} - 0.0329575464578*D_{1997} - 0.026821975006*D_{2009} - 0.0739952287742*D_{2020} + 3.87758593712$

Cointegrating Equation:

$EC = LGDP(-1) - (0.079895*LME(-1) + 0.131530*LEE + 27.546191)$

II.3.3 Cointegration:

II.3.3.1 Bounds testing:

Pesaran et al. (2001) propose a contemporary method for evaluating the long-run equilibrium relationship, known as bounds testing. This approach entails evaluating the null hypothesis H_0 (absence of cointegration between variables) against the alternative hypothesis H_1 (presence of cointegration between variables) (DAVIDESCU, 2015, p. 41). The table presented herein outlines the results of the bounds test, which substantiate the presence of a long-term relationship within the Unconstrained Error Correction Model (UECM) framework:

Table(3):Bounds testing

F-bound Test	Null Hypothesis: No long-run Relationship
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Test Statistic	Value	Signif	F : I(0)	I(0) T :	F: I(1)	I(1) T :
F-statistic	14.399522	10%	3.170	- 2,570	4.140	- 3,210
		5%	3.790	- 2,860	4.850	- 3,530
T-statistic	-5,536264	1%	5.150	-3,43	6.360	- 4,100

Source: Compiled by the researchers utilizing data from EViews 13.

The table reveals that the computed Fisher F-statistic (14.399522) exceeds the upper bound critical values for I(1) at the 1%, 5%, and 10% significance levels. As a result, we reject the null hypothesis in favor of the alternative hypothesis, which indicates the presence of cointegration and a long-term relationship among the study variables.

To validate this relationship, it is essential to compare the absolute value of the T-statistic with the critical values of the lower and upper bounds. The computed T-statistic is observed to surpass the tabulated critical values, thereby confirming the existence of a logically consistent and long-term equilibrium relationship between the study variables.

II.3.3.2 Estimation of long- and short-term parameters in the ARDL model

Estimation of long-term parameters: The subsequent table displays the estimates for the parameters related to the long-term relationship.

Table (4):displays the results of the ARDL (1,1,0) model estimation.

Variables	Coefficient	Std.error	t- statistic	Prob
LME(-1)	0,079895	0,063067	1,266832	0,2136
LEE	0,131530	0,058915	2,232543	0,0321
CE=LGDP(-1) – (0,079895* LME(-1)+0,131530* LEE)				

Source:Compiled by the researchers based on data from Eviews 13.

It can be concluded from the table that management expenses are not significant in the long run (ME), while equipment expenses (EE) are significant. The more equipment expenses are significant by one unit, the higher the GDP by 0.131530%, i.e. a direct relationship between them, which is consistent with the economic reality in Algeria. Since management expenses is of a consumer nature, as it includes current costs such as salaries and wages, in addition to administrative expenses, which are often consumed, and this consumption is not matched by an addition in productive value. Despite its necessity for the functioning of institutions and the maintenance of public services, it does not necessarily contribute to increasing the gross domestic product. In addition to that it does not achieve long-term growth because it does not contribute significantly to capital formation and an increase in production.

As for equipment expenses, they are spent in order to invest in infrastructure, such as investment projects in all sectors. Investments bolster the country's productive capacity and economic growth by enhancing the efficiency of various economic sectors. They also generate a multiplier effect by

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creating job opportunities and fostering broader economic benefits. That is, we can say that equipment expenses, which in turn, geared towards investing in infrastructure and major projects, is the main driver of economic growth in Algeria.

Estimation of short-run parameters: Subsequent to establishing a cointegration relationship between the study variables through the bounds test, we advance to estimating the short-run dynamics using the error correction model within the ARDL framework. This methodology addresses potential issues related to spurious correlations.. (Abderrahmane, 2014)

The estimation results appear through the table below:

Table (5):represents an estimate of the short-term relationship of the model

Variables	Coefficient	Std. Error	t-Statistic	Probability
CointEq(-1)	-0.140767	0.020666	6,811642	0,0000
D(LME)	-0,045228	0,013538	3,340714	0,0023
C	3,877586	0,564471	6,869412	0,0000

Source:Compiled by the researchers based on data from Eviews 13.

The estimation results displayed in the preceding table reveal that the error correction term parameter is negative and statistically significant. This outcome confirms that the necessary and sufficient conditions for establishing a short-term equilibrium relationship are fulfilled, indicating that the study variables exhibit a tendency to converge towards a long-term equilibrium. Specifically, the model suggests that 14.07% of the deviation from equilibrium is corrected annually, signifying an adjustment speed of 14.07% from the short term to the long term.

There is a significant inverse relationship between management expenses (ME) and GDP in the short term. Specifically, a one-unit increase in management expenses is associated with a 0.045228% decrease in GDP. This suggests that management expenses exhibit a consumption rather than a production pattern. Furthermore, the tax burden, compounded by the Algerian government's reliance on petroleum revenues and taxes to cover its expenses, exerts a controlling effect on economic activity. This, in turn, has a detrimental impact on economic growth.

III. Diagnostic testing of the model:

The model's quality and validity are evaluated to determine its accuracy and suitability for reliable economic diagnosis and analysis. This evaluation is conducted through four distinct diagnostic tests, as outlined in the following table:

Table(6):presents the tests for the model's validity and quality

Test	F-statistic	P value
Breusch-Godfrey Serial Correlation LM Test	0.717812	0.4976
Heteroskedasticity Test: ARCH	0.012739	0.9108
Jarque-bera Test	5.144563	0.076361
Ramesy Test	0.593595	0.4480

Source:Compiled by the researchers based on data from Eviews 13.

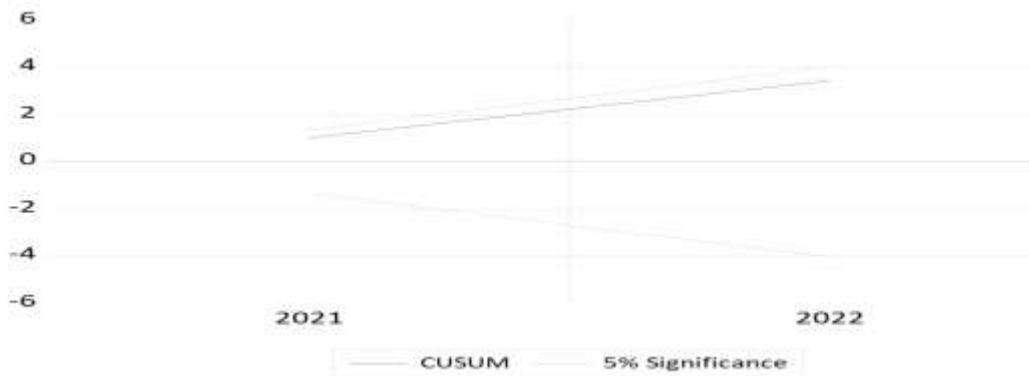
From the table, it is observed that the p-values exceed 0.05. Consequently, we fail to reject the null hypothesis at the 5% significance level. Based on the LM test, there is no evidence of serial autocorrelation in the errors. Additionally, the ARCH test indicates the absence of heteroscedasticity, as the Fisher statistic's p-value exceeds 5%. Thus, we accept the null hypothesis and reject the alternative. The Jarque-Bera test suggests that the residuals follow a normal distribution, given that the p-value is greater than the 5% significance level. Accordingly, we accept

the null hypothesis that the errors are normally distributed. (Al-Jundali Abdul Qader, 2021) Finally, the Ramsey test assesses the model's validity and appropriateness, with the p-value exceeding 5%, leading us to accept the null hypothesis of model validity and reject the alternative hypothesis of model inadequacy.

IV. Evaluating the stability of the estimated ARDL model:

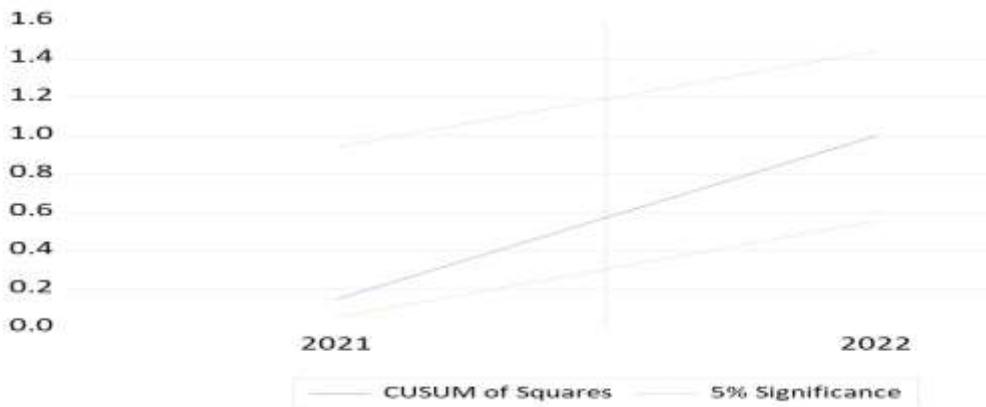
To assess the structural stability of the estimated ARDL model and its long- and short-term relationships over the estimation period, we will employ the cumulative sum of recursive residuals (CUSUM) test and the cumulative sum of squares of residuals (CUSUMSQ) test, as introduced by Brown and colleagues. If the histograms for both tests fall within the critical bounds at the 5% significance level, we accept the null hypothesis that all model parameters remain stable. (Brown, 1975)

Figure 06: displays the cumulative sum of squared residuals.



Source: Compiled by the researchers based on data from Eviews 13.

Figure 07: Cumulative sum of squares of follow-up residuals.



Source: Compiled by the researchers based on data from Eviews 13.

Figures (6) and (7) clearly illustrate that the histograms for the two tests fall within the critical bounds, indicating that both the long- and short-term parameters of the estimated ARDL model are stable.

It is clear to us from the above that the model does not suffer from standard problems or structural changes, which indicates the validity and suitability of this model.

Conclusion

The Impact Of Government Spending On Economic Growth
An Econometric study Of The Case Of ALGERIA During The Period (1985-2022)

In conclusion, this article asserts that government spending, particularly on management and equipment expenses, plays a crucial role in fostering economic growth in Algeria. The period (1985-2022) witnessed several economic fluctuations

In this study, we examined the connection between government spending and economic growth in Algeria from 1985 to 2022. This period was marked by various economic and political fluctuations that significantly impacted the efficacy of government spending. Management expenses contribute to meeting the daily needs of society and social stability, while equipment expenses are spent on investment in infrastructure in addition to development projects and programs, which in turn create job opportunities and support productivity in the long term. Through this study, we can extract the most important results reached in the following points:

Analytical aspect:

- By analyzing the reality of government spending during the study period, it became clear that the government depends on its revenues to cover management and equipment expenses.
- Government spending was affected by fluctuations in oil prices, which means that Algeria's economy still suffers from oil dependency
- The government's efforts to reduce oil dependency and diversify income, as evidenced by increased spending on infrastructure and various growth initiatives.

Applied aspect:

- The results of the unit root tests using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) methods indicate that all variables are stationary at the first difference, with both a constant and a general trend, thereby being integrated of order one, I(1).
- The presence of a cointegration relationship as determined by the Bounds test, which means that there is a long-term equilibrium relationship between EE and GDP, while the relationship between ME and GDP is not significant. This is explained by economic reality. There is a long-term relationship between EE and GDP, where equipment expenses show their added value in the long term, as mentioned previously (investment in infrastructure, development programs and projects...).
- The estimation results of the error correction model indicate a short-term equilibrium relationship between the study variables, with a convergence rate of 14.07% towards long-term equilibrium.
- The diagnostic test results confirm that the estimates for both the long- and short-term parameters are robust and suitable for precise economic analysis.
- Finally, the model stability test showed that the model is structurally stable.

Testing the validity of hypotheses:

- First hypothesis: There is an inverse short-term relationship between management expenses (ME) and economic growth.
- Second hypothesis: There is a long-term positive relationship between equipment expenses (EE) and economic growth.

Recommendations and advice:

The government must rationalize its expenditures and develop spending plans. Monitoring and identifying development projects and programs and investments in infrastructure to eliminate corruption and the plunder of funds related to these projects.

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Appendices

Appendix 1: Estimation results of the initial ARDL model

Dependent Variable: LGDP
Method: ARDL
Date: 09/02/24 Time: 22:06
Sample: 1986 2022
Included observations: 37
Dependent lags: 2 (Automatic)
Automatic-lag linear regressors (2 max. lags): LME LEE
Static regressors: D_1993 D_1994 D_2020 D_1997 D_2009
Deterministics: Unrestricted constant and no trend (Case 3)
Model selection method: Akaike info criterion (AIC)
Number of models evaluated: 18
Selected model: ARDL(1,1,0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LGDP(-1)	0.859233	0.025426	33.79310	0.0000
LME	-0.045228	0.018539	-2.439536	0.0216
LME(-1)	0.056474	0.015575	3.626029	0.0012
LEE	0.018515	0.010021	1.847595	0.0756
D_1993	-0.067051	0.013465	-4.979459	0.0000
D_1994	-0.059701	0.014039	-4.252523	0.0002
D_2020	-0.073995	0.012871	-5.749056	0.0000
D_1997	-0.032958	0.013020	-2.531360	0.0175
D_2009	-0.026822	0.013304	-2.016061	0.0538
C	3.877586	0.708381	5.473873	0.0000
R-squared	0.998880	Mean dependent var	30.15155	
Adjusted R-squared	0.998506	S.D. dependent var	0.313300	
S.E. of regression	0.012109	Akaike info criterion	-5.764328	
Sum squared resid	0.003959	Schwarz criterion	-5.328945	
Log likelihood	116.6401	Hannan-Quinn criter.	-5.610835	
F-statistic	2674.851	Durbin-Watson stat	1.703749	
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent test results do not account for model selection.

Appendix 2: Estimation results of the second model using made-up variables.

The Impact Of Government Spending On Economic Growth **An Econometric study Of The Case Of ALGERIA During The Period (1985-2022)**

Dependent Variable: LGDP
Method: ARDL
Date: 09/02/24 Time: 21:49
Sample: 1985 2022
Included observations: 37
Dependent lags: 2 (Automatic)
Automatic-lag linear regressors (2 max. lags): LME LEE
Deterministics: Restricted constant and no trend (Case 2)
Model selection method: Akaike info criterion (AIC)
Number of models evaluated: 18
Selected model: ARDL(1,0,0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LGDP(-1)	0.925142	0.036769	25.16110	0.0000
LME	0.025411	0.012975	1.958383	0.0587
LEE	-0.006271	0.014821	-0.423137	0.6749
C	2.008870	1.014628	1.979909	0.0561
R-squared	0.995494	Mean dependent var	30.15155	
Adjusted R-squared	0.995084	S.D. dependent var	0.313300	
S.E. of regression	0.021967	Akaike info criterion	-4.696768	
Sum squared resid	0.015924	Schwarz criterion	-4.522616	
Log likelihood	90.89021	Hannan-Quinn criter.	-4.635371	
F-statistic	2430.014	Durbin-Watson stat	1.658798	
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent test results do not account for model selection.

Appendix 3: Bounds test results.

Bounds Test

Null hypothesis: No levels relationship
Number of cointegrating variables: 2
Trend type: Unrest. constant (Case 3)
Sample size: 37

Test Statistic	Value
F-statistic	14.399522
t-statistic	-5.536264

Bounds Critical Values

Sample Size	10%		5%		1%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F-Statistic						
35	3.393	4.410	4.183	5.333	6.140	7.607
40	3.373	4.377	4.133	5.260	5.893	7.337
Asymptotic	3.170	4.140	3.790	4.650	5.150	6.360
t-Statistic						
Asymptotic	-2.670	-3.210	-2.860	-3.630	-3.430	-4.100

* I(0) and I(1) are respectively the stationary and non-stationary bounds.

Appendix 4: Results of estimating a long-run relationship.

Cointegrating Specification

Deterministics: Unrest. constant (Case 3)

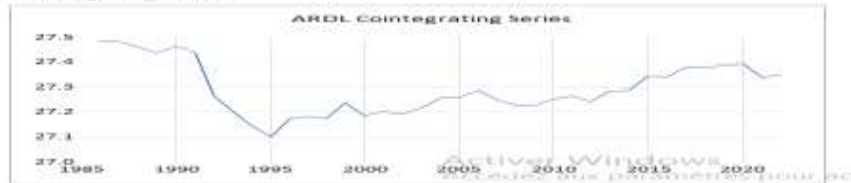
$$CE = LGDP(-1) - (0.079885 \cdot LME(-1) + 0.131830 \cdot LEE)$$

Cointegrating Coefficients

Variable *	Coefficient	Std. Error	t-Statistic	Prob.
LME(-1)	0.079885	0.053067	1.260832	0.2139
LEE	0.131830	0.058818	2.232843	0.0321

Note: * Coefficients derived from the CEC regression

Cointegrating Series



Appendix 5: Results of the error correction model estimation.

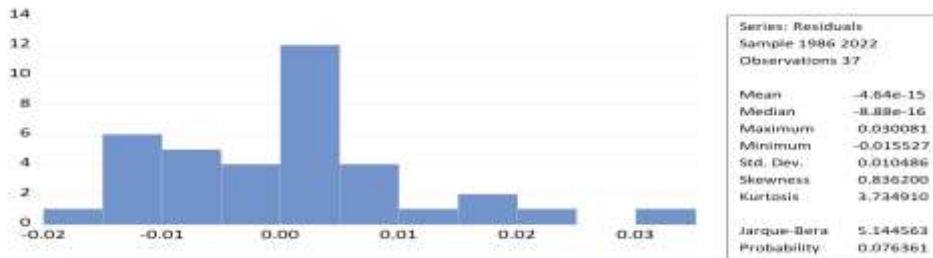
Error Correction

Dependent Variable: D(LGDP)
Method: ARDL
Date: 09/02/24 Time: 22:06
Sample: 1986 2022
Included observations: 37
Dependent lags: 2 (Automatic)
Automatic-lag linear regressors (2 max. lags): LME LEE
Static regressors: D_1993 D_1994 D_2020 D_1997 D_2009
Deterministics: Unrestricted constant and no trend (Case 3)
Model selection method: Akaike info criterion (AIC)
Number of models evaluated: 18
Selected model: ARDL(1,1,0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COINTEQ*	-0.140767	0.020666	-6.811642	0.0000
D(LME)	-0.045228	0.013538	-3.340714	0.0023
D_1993	-0.067051	0.012119	-5.532755	0.0000
D_1994	-0.059701	0.012307	-4.850797	0.0000
D_2020	-0.073995	0.012133	-6.098820	0.0000
D_1997	-0.032958	0.012113	-2.720852	0.0109
D_2009	-0.026822	0.012056	-2.224848	0.0340
C	3.877586	0.584471	6.869412	0.0000
R-squared	0.809841	Mean dependent var		0.022724
Adjusted R-squared	0.763940	S.D. dependent var		0.024047
S.E. of regression	0.011684	Akaike info criterion		-5.872436
Sum squared resid	0.003959	Schwarz criterion		-5.524130
Log likelihood	116.6401	Hannan-Quinn criter.		-5.749642
F-statistic	17.64341	Durbin-Watson stat		1.703749
Prob(F-statistic)	0.000000			

* p-values are incompatible with t-Bounds distribution.

Appendix 6: Results of the normal distribution test



Appendix 7: Results of variance invariance test for errors.

Breusch-Godfrey Serial Correlation LM Test
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.717812	Prob. F(2,25)	0.4976
Obs*R-squared	2.009337	Prob. Chi-Square(2)	0.3662

Appendix 8: Results of the error homogeneity test

Heteroskedasticity Test: ARCH

F-statistic	0.012739	Prob. F(1,34)	0.9108
Obs*R-squared	0.013483	Prob. Chi-Square(1)	0.9076

Appendix 9: Results of the model validity test.

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: LGDP LGDP(-1) LME LME(-1) LEE D_1993 D_1994 D_2020 D_1997 D_2009 C

	Value	df	Probability
t-statistic	0.770451	26	0.4480
F-statistic	0.593595	(1, 26)	0.4480
Likelihood ratio	0.835232	1	0.3608
F-test summary:			
Test SSR	8.84E-05	1	8.84E-05
Restricted SSR	0.003959	27	0.000147
Unrestricted SSR	0.003870	26	0.000149
LR test summary:			
	Value		
Restricted LogL	116.6401		
Unrestricted LogL	117.0577		

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Appendix 10: unit root test.

UNIT ROOT TEST TABLE (PP)				
<u>At Level</u>				
		LGDP	LME	LEE
With Con...	t-Statistic	0.1483	-2.1079	-0.9858
	Prob.	0.9653	0.2428	0.7483
With Con...	t-Statistic	n0	n0	n0
	Prob.	n0	n0	n0
With Con...	t-Statistic	-2.2305	-0.9557	-1.8752
	Prob.	0.4596	0.9381	0.6470
Without C...	t-Statistic	4.0638	3.8571	2.7682
	Prob.	1.0000	0.9999	0.9981
<u>At First Difference</u>				
		d(LGDP)	d(LME)	d(LEE)
With Con...	t-Statistic	-4.2942	-4.3215	-5.8957
	Prob.	0.0017	0.0016	0.0000
With Con...	t-Statistic	-4.2822	-4.5248	-5.9535
	Prob.	0.0089	0.0048	0.0001
Without C...	t-Statistic	-2.6207	-2.6875	-4.9102
	Prob.	0.0103	0.0086	0.0000

UNIT ROOT TEST TABLE (ADF)				
<u>At Level</u>				
		LGDP	LME	LEE
With Con...	t-Statistic	0.4413	-2.2368	-0.8895
	Prob.	0.6821	0.1973	0.7473
With Con...	t-Statistic	n0	n0	n0
	Prob.	n0	n0	n0
With Con...	t-Statistic	-2.9581	-0.9557	-1.5488
	Prob.	0.3512	0.9381	0.7937
Without C...	t-Statistic	5.7952	4.8353	2.9712
	Prob.	1.0000	1.0000	0.9989
<u>At First Difference</u>				
		d(LGDP)	d(LME)	d(LEE)
With Con...	t-Statistic	-4.2449	-4.3215	-5.8934
	Prob.	0.0020	0.0016	0.0000
With Con...	t-Statistic	-4.2134	-4.6971	-5.9535
	Prob.	0.0105	0.0021	0.0001
Without C...	t-Statistic	-1.5758	-2.8947	-4.8990
	Prob.	0.1170	0.0058	0.0000
Notes: (*) Significant at the 10%, (**) Significant at the 5%, (***) Significant at the 1% and (n0) Not Significant. Mackinnon (1996) one-sided p-values.				
This Research Is The Own Part of Program Has Developed By: Dr. Ines Abdellah ALMousleh College of Business and Economics Qassim University-KSA				