The effect of government spending on the unemployment rate in Algeria in the light of fluctuations in oil prices, using a model ARDL

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Abstract:
This study aimed to estimate the impact of government spending on the unemployment rate in Algeria in light of fluctuations in oil prices.
The autoregressive distributed lag model was relied upon to process the collected data during the period 1990-2020 using the Eviews10 program.
The study concluded that there is a weak inverse relationship between government spending and unemployment rate, as the increase in government spending led to an increase in the total demand for operating the productive system as well as for employment, which was included in the Keynesian theory. However, this relationship remains relatively limited due to dependence on the oil resource mainly for financing the general budget, and the weakness of the flexibility of the productive apparatus.
***Key Words*:** Government spending; Unemployment rate; Oil prices; Algerian Economy; ARDL model**.**

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Introduction :

Unemployment is one of the main problems that threaten the Algerian economy and which the state has been striving to combat in every way since the independence. Because of its negative effects on the economy and society, and to curb this scourge, government spending has been relied upon, especially with the improvement of state revenues as a result of the high oil prices which make for a substantial share of state revenues in the form of taxes.

Many oil-exporting countries such as Algeria depend on oil wealth to finance their development projects. The employment of the accumulated financial surpluses serves to build the foundations of the state, including infrastructures, economic facilities, and the purchase of weapons.

Furthermore, and in addition to supporting the vulnerable classes in society, Algeria is one of the rentier countries that mainly depend on oil resources for financing general budget and the plans for economic and social development, which is considered a blessing and a curse at the same time. Volatility of oil prices have a

direct impact on the general budget of the state and thus on the management of government spending as well. In addition, other than economic reasons threatening to cause global oil price fluctuations, other factors play a hand such as the emergence of The Corona Virus (Covid 19) pandemic and the national production being weak and fragil. This made it a more consuming country than a producing one, as oil prices in April 2020 reached the exchange reserve levels.

Many economic studies confirm that Algeria suffers from the Dutch disease, and it must reconcile the increasing government spending to achieve economic development and provide the necessary funds to cover this spending. Accordingly, our study aims at a set of goals that we seek to achieve mainly, knowing the extent of the impact of government spending on the unemployment rate in light of fluctuations in oil prices in Algeria during the period 1990-2020, by conducting quantitative statistical tests to study the stationarity of time series of variables. Then, testing the equilibrium relationship between the variables in the long and short term by building an econometric model for the effect of government spending on unemployment rates in Algeria, and testing the hypothesis of the relationship between unemployment rate and government spending in Algeria during the period 1990-2020.

I. Theoretical Background And Literature Review

This section reviews the empirical literature and considers the theoretical framework about the impact of government spending on the unemployment rate in Algeria.

1. Literature Review

El Mawla & Habashneh (2017) tried to examine the effect of public expenditure on employment in Jordan for the period 1990-2015. The study applied unit root (ADF) and Granger causality, cointegration tests and VECM to examine the relation between Expenditures and employments for Jordan. The study concluded that there is not any causality between current expenditure and employment, and there is a unidirectional causality from employment to public expenditure. Furthermore, according to our regression results, capital expenditure affects employment positively. This result implies that a 1% increases in capital expenditures will increase employment by 0,28% (El Mawla & Habashneh, 2017).

Mechri (2020) worked on measuring the impact of public spending on unemployment in Algeria during the period 2000-2016, through determining which part of public spending (running expenses, equipment expenditures) can better reduce the problem of unemployment, since this period witnessed the launch of newest development programs during independence. The results show that despite the recorded decline in the unemployment rate, it did not achieve the expected results. Surprisingly, most of the new positions were temporary, which confirms that the Algerian economy suffers from postponed unemployment. And informal employment. Furthermore, most of the new positions were in non-productive sectors, which disrupts the Keynesian proposition adopted by Algeria in order to achieve growth and full employment, which requires the use of productive machines to increase overall demand. More importantly, the practical study showed that the

unemployment response to the expansion of spending is ineffective for long term objectives (Mechri, 2020).

Nepram et al (2021) examined the existence of the relationship in states of India by using panel data analysis. For more comprehensive study, public expenditure is divided into development, non-development, and aggregate expenditures, while the types of unemployment under consideration are usual status and current weekly status. Indeed, it has been observed that development and non-development expenditures increase both the types of unemployment though the impact of the latter is higher. The findings implied that a cut in expenditure can be an important fiscal tool to fight unemployment. It was further observed that unemployment was higher among states with a more educated population, which also suggests a revisiting of the education policy in the country. States ruled by left parties have higher unemployment rate. Higher income states as well as states with higher growth rate tend to have lower unemployment rate (NEPRAM, SINGH, & JAMAN, 2021).

There are many studies that have tried to measure the relationship between government spending and unemployment, and most of them have reached mixed results due to the different analysis period adopted and the data processing methodology, while our study focused on employing large government spending, including current and investment expenses, by building a econometric model using the Autoregressive Distributed Lag approach ARDL, the study also included the various development programs that Algeria experienced during the period 1990-2020, which reflect in particular the evolution of its vision in the embodiment of the social role. Considering to the rentier nature of the Algerian economy, focus has been placed on fluctuations in oil prices as the most important variable that has a direct impact on the fiscal policy.

2. Theoretical foundations

2.1. The government spending

a. Definition of government spending

The concepts of government spending varied according to the scholars, linguists, educators, economists, financial accountants and decision makers.

Government spending expresses the size of government intervention and the public expenses, either by the central government or local governments, and it is one of the aspects of the economic policy adopted by the state. Government spending can be used as one of the criteria for measuring the size of the state in economic activity (Ayeb, 2010, p. 100).

It is also known as: “One of the components of aggregate demand, and through a change in it, the level of aggregate demand is affected, and thus the impact on the level of output, employment and the general level of prices” (El Suraiti & El Naja, 2013, p. 28).

It is also defined as: “the sum of cash spent by the state or one of its public bodies for the purpose of achieving a public benefit. (El Sayed Radi & El Sayed, 2017, p. 119)”

According to the aforementioned definitions, government spending can be defined as those sums of money spent by the state or one of its agencies with the

intention of achieving a public benefit. Therefore, government spending can be considered to have three pillars: to be in the form of cash, issued by the state or a public person, and aims to achieve public benefit.

b. Pillars of government spending

Government spending includes three basic elements that are considered at the same time distinguishing characteristics that set it apart from other types of spending carried out by the state, which are (Adly Nashed S. , 2009):

Government spending is a monetary amount;

The issuance of government spending by the state or a public person;

Expenditure is intended to achieve the public good;

-Government spending is a monetary amount:

Government spending usually takes a monetary nature, represented by what is paid by the state or its public agencies, to obtain the productive resources of goods and services that it needs to carry out its activities, such as paying the salaries and wages of workers and paying the expenses of the army, security forces, services and public utilities (Hassan Odeh, 2017, p. 126).

- Issuance of government spending by the state or a public person:

This pillar is considered the main pillar that provides government spending considering that the party that performs the spending is the public institutions of the state at its various levels of government, whether at the central level or at the level of localities (Abd el Hamid, 2005, p. 185), including public bodies and institutions (included in the public economy). With a legal personality, as well as the states in the federal countries, and has local public persons shall be as provincial councils for cities and villages in the unified states (Adly Nashed, 2009, p. 26).

-Spending is intended to achieve the public benefit:

This pillar is considered essential to the concept of government spending. Without it, government spending would not be possible, even if it was issued by a public law person, the goal of government spending should be to achieve the public benefit of society and achieve its interests.

The concept of public benefit is expanded to include the achievement of some social and economic goals. Government spending may be aimed at reducing the gap in income distribution between the rich and the poor by providing some cash and in-kind subsidies to the poor, such as food subsidies, health services, education services...etc.

Government spending aims to achieve economic stability, such as reducing the problem of unemployment and subsidies for transferring training for workers and employees (Othman, 2008, pp. 464-465).

2.2. The unemployment

a. Definition of unemployment

Jean-Patiste Say defined unemployment as: “The obstruction of circulation due to the lack of buyers for the quantity of the goods produced, and then many machines stop working, and many workers become unemployed” (El Sarahna & Hassan, 2000, p. 47).

There are two basic conditions that come together to define the unemployed, namely (Ben hussein, mubarki, & Aissaoui, 2002, p. 116):
That the person is able to work;
To look for a job opportunity;

On the basis of this, economists and experts, as recommended by the International Labor Organization, unify the definition of the unemployed as everyone who is able to work, is willing to work, seeks it and accepts it at the prevailing wage level, but to no avail. This definition applies to those who enter the labor market for the first time. And to the unemployed who previously worked and had to leave it for any reason.

According to the Algerian National Bureau of Statistics, the term "without work" means "unemployed" and is represented by a person who simultaneously fulfills the following crteria:
be of working age, i.e. 16-64 years;
Without work during the investigation period;
That he has made a serious search for work;

To be ready for any paid or unpaid work during the assignment period.
So, based on the previous definition, we note that there are three criteria that must apply together in order for an individual to be considered unemployed, namely:
- That the individual is able to work:

Under this criterion, individuals who exceed the age specified for measuring the economically active population and are not working, whether for wages or for their own account, are included under this criterion.
- That the individual is available for work:

This criterion includes individuals who wish to work and are ready for it for a wage or for their own account during the research period.
-That the individual is looking for work:

This criterion is based on the fact that the individual has taken serious steps to search for paid work or for his own account.

b. Measuring Unemployment

The unemployment rate is one of the macroeconomic indicators of great significance in formulating economic policies and evaluating their effectiveness. The unemployment problem cannot be treated unless there is a real perception of it. The unemployment rate is usually measured by official authorities, as the ratio of the number of unemployed to the labor force in society (active class) at a certain point in time using the following formula (Rahimi, Qarqad, & El Ayeb, 2018, p. 145):

Unemployment rate = number of unemployed people / active category * 100

The active category consists of individuals who are of working age, who are able and willing to work, whether they work or not they work, if: Active category = workers + active.

By employees, it means anyone who works full or part-time, even if he works one or two hours per day in return for wages with others or in an institution.

As for the unemployed, they are individuals who are able, willing and looking for work, and do not find available job opportunities for them.

As for the individuals who are excluded from the active category are:

- Individuals under a certain age:

Individuals under a certain age: They are individuals who are under the legal working age of 16 or over;

Individuals over a certain age, i.e. retirement or pension, which is 65 years and over;

- Individuals of certain categories:

groups who are unable to work for various reasons, such as the sick, the infirm and school students;

Individuals who do not demand jobs in society despite their ability to work, such as housewives or individuals who are neither looking for nor wanting to work;

Individuals who stop looking for work because of the desperation that afflicts them as a result of the lack of suitable job opportunities for them.

2.3. The oil price:

a. **Definition of oil price:** The oil price is defined as: "that monetary value that is given to the oil commodity during a certain period and specific as a result of the impact of several economic, social, political and climatic factors in addition to the nature of the prevailing market at the time (Antoine, 1987). Another definition of the oil price can be given: it is the monetary value or monetary image of a barrel of crude oil measured in US dollars, and this price is subject to constant fluctuations due to the dynamic and instability of the international oil market, which was reflected in oil prices and made them unstable and subject to constant fluctuations. Until the phenomenon of fluctuations became a phenomenon of concern at the global level since the early seventies of the last century and its continuation until now (Adnani, Aqassim, & Mqadem, 2019).

b. **Determinants of the price of oil:**The oil price is determined by a set of basic components of the oil market:

b.1. Oil demand: The International Energy Agency (IEA) defines oil demand as: "It consists of distributor commitments from refineries and special quantities or refined oil for direct distribution (Oel).

There are many different factors, some of which are primary and the other secondary, that affect the determination of the demand for oil, whether it is a positive effect, i.e. an increase in demand, or a negative effect, i.e. a decrease in it. These factors are as follows (Douifi, 2016):

- The rate of economic growth and industrial development;
- Prices of substitute commodities;
- The price of crude oil;
- Political stability in the world;
- Climate;
- Population growth:

b.2. Oil supply: The oil supply is the second aspect of the oil price equation, as it directly affects it the greater the supply of oil, the lower the prices, and vice versa.

The oil supply is affected by many factors and causes that affect the global supply of oil, whether it increases or decreases, and the most important factors are (Mour, 2014):

- The demand for oil;
- The price;
- Reserves and production capacity;
- The price of substitute goods;
- Competition between oil producers;
- High profits in the oil industry;
- The technological and technical level of production tools.

II. Methodology of the econometric study:

This study aimed to estimate the impact of government spending on the unemployment rate in Algeria in light of fluctuations in oil prices.

The autoregressive distributed lag model was relied upon to process the collected data during the period 1990-2020 using the eviews10 program.

1. The nature of the variants and the source of the data

a. Dependent variables: The dependent variable is the unemployment rate and is denoted by UN**.** The unemployment rate (as defined by the International Labor Office) is expressed as a ration of the total unemployed forces to the total active forces. Its data was retrieved from the World Bank website.

b. Independent variables: The total government spending in Algeria is denoted as LGE, whereas the price of oil is symbolized as LOP and the currency block is referred as LM2. Data related to these variables is collected from National Bureau of Statistics (ONS) and Arab Monetary Fund.

2. The econometric Model :

The Niperian logarithm has been introduced to the explanatory variables defined above, in order to reduce the variance of the time series. and make the relationship linear between the variables except (unemployment rate), with the help of eviews10, the following model will also be used, whose variables have been deduced through studies that dealt with a similar topic:

$$UN = \beta 0 + \beta 1 LGEt + \beta 2 LOPt + \beta 3 LM2t + \varepsilon t \qquad (1)$$

Where:

$\beta 0$: represents the constant term in the unemployment rate equation;

$\beta 1$, $\beta 2$, $\beta 3$: represent the elasticities (total government spending, oil price, money supply), respectively.

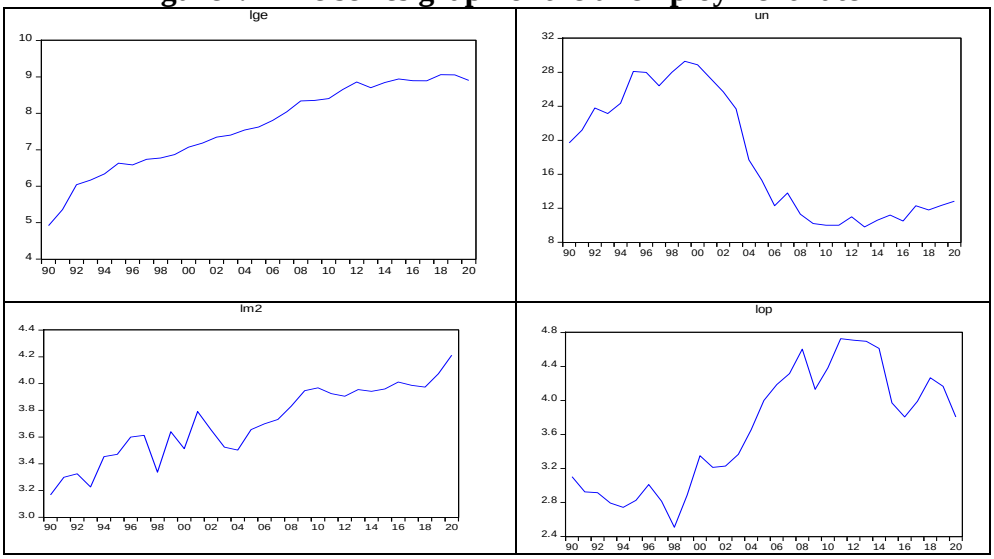
εt: is a random variable.

2.1. The stationarity of time series

As a first step to study the relationship between variables, we test the stationarity of time series, which is a condition of cointegration where these variables must be stationary, because time series related to macroeconomic variables that are characterized by non stationary result in what is known as the problem of false regression.

a. Graphical analysis: Through the graphs of the time series in (figure no. 1) it is clear that the time series have a time vector in the form of fluctuations, which raises doubts about their non stationary in the level.

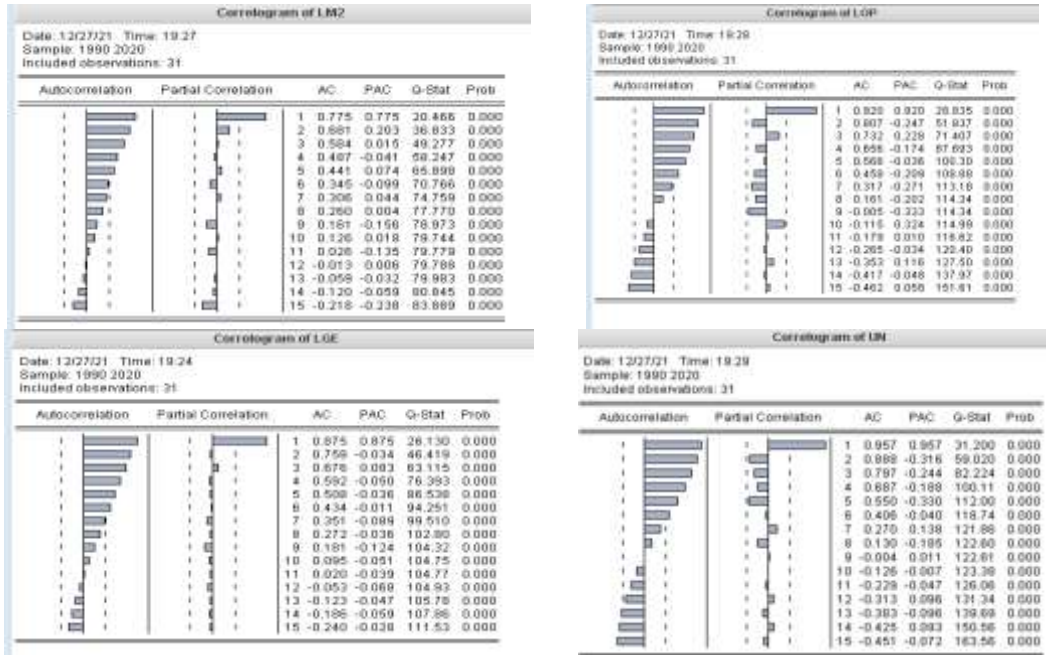
Figure1. Time series graph of the unemployment rate



Source: Authors based on Eviews10 outputs.

b. The autocorrelation function: Through the graphs of the time series in (figure. 2) it is clear that the graphs of the autocorrelation function for time series at the level: UN, LGE, LOP,LM2: that all variables have coefficients in the autocorrelation function that differ significantly from zero, and therefore it can be said that these series are non stationary.

Figure 2. Autocorrelation function



Source: Authors based on Eviews10 outputs.

2.2.Unit root tests

Unit root tests are used to detect the stationarity of time series, and since we have adopted the same explanatory variables (LGE, LOP, LM2), we study the stationarity of the dependent variable only, and we have used the extended augmented Dickey-Fuller test and Phillips-Peron test to test the existence of a unit root, and here the program will be used Statistician eviews10 to do these two tests.

a. Expanded ADF and Phillips-Peron PP tests for the stationarity of time series (at the level): The following table shows a summary of the results of the PP and ADF test according to the outputs of the statistical program eviews10, for the time series at the level as follows:

Table1. Results of PP and ADF Tests for the stationarity of time series (At Level)

Time series	Comparison standard	ADF Test			PP Test			The decision
		fixed and general direction	only fixed	without them	fixed and general direction	only fixed	without them	
UN	t stat	-1.7664	-0.5286	-0.8054	-2.0887	-0.9240	-0.7556	non stationary
	Prob	0.6956	0.8719	0.3587	0.5310	0.7664	0.3805	
LGE	t stat	-2.7847	-3.8930	3.5908	-2.8220	-3.7708	2.8093	non stationary
	Prob	0.2133	0.0058	0.9998	0.2008	0.0078	0.9981	
LOP	t stat	-1.2830	-1.1557	-0.2582	-1.4926	-1.1501	0.2871	non stationary
	Prob	0.8729	0.6800	0.7543	0.8097	0.6823	0.7624	
LM2	t stat	-4.5770	-0.8171	1.9813	-4.5732	-1.0759	6.2645	non stationary
	Prob	0.0052	0.7992	0.9864	0.0052	0.7120	1.0000	

Source: Authors based on Eviews10 outputs.

Through (table. 1) it is clear that all time series are non stationary at the level, and we can analyze the data of this table as follows:

UN series: We notice from the table that the probability value when performing the ADF and PP tests in the level in the three models is completely greater than the 5% level of significance, and this indicates that the t-statistic values in the series, which are in their absolute values, are less than the critical tabular values at the 5% level of significance according to for McKinnon's (1996) table, which is estimated at 2.94, 3.53 and 1.95, respectively, and based on that, the null hypothesis H0 is accepted, which says that there is a unit root, which means rejecting the alternative hypothesis H1 which says that the series is stationary and that there is no unit root.

LGE series: It is clear from the above table that the probability value of the detection test the presence of the secant in the second model when the PP and ADF tests are performed at a level less than 0.05, this indicates that the calculated value of the student (t student) test when performing the PP and ADF tests at the level, which in its absolute values, is greater than the critical tabular values at the 5% level of significance.Therefore, the hypothesis that there is no unit root is accepted, as for

the probability value when performing the PP and ADF tests at the level in the first and third models, it is exactly greater than 0.05, this indicates that the calculated value of Student's test is less than its tabular values this leads us to accept the null hypothesis, and if one of the three models contains a unit root, then the series is not static thus, we accept the null hypothesis which states that the unit root and the series are non stationary. LOP series: We note from the table that the critical probability statistic P at the 5% level of significance when conducting the two tests ADF and PP at the level for the serie in the three models is greater than 0.05, this indicates that the values of the t-statistic in the two series, when the ADF and PP tests are performed, are at the level in the three models, and their absolute values are less than the critical tabular values at the 5% significance level. According to McKinnon's (1996) table, which are estimated at 2.94, 3.53 and 1.95,respectively, accordingly, the null hypothesis H_0 . is accepted, which says there is a unit root, which means that the alternative hypothesis H_1. is rejected and according to the stability of the series and the absence of a root unit. thus, the serie are non stationary DS. LM2 series: Regarding the cash block, the probability value was estimated when taking the PP and ADF tests at the level, in the second and third models, it is exactly greater than 5%, this indicates that the value of the t-statistic, which in its absolute values, is less than the critical tabular values at the 5% level of significance. Accordingly, the null hypothesis H_0. is accepted which says there is a unit root,this means, that the alternative hypothesis H_1 . is rejected and according to the stationary of the series and the absence of a root unit.

b. P test for time series by taking the first difference: The results of these two tests for the time series are shown by taking the first difference in the following table.

Table 2. PP and ADF test results for time series by taking the first difference

Time series	Comparison standard	ADF Test			PP Test			The decision
		fixed and general direction	only fixed	without them	fixed and general direction	only fixed	without them	
UN	t stat	-3.7752	-0.38591	-3.8697	-3.7364	-3.8295	-3.8274	stationary
	Prob	0.0328	0.0065	0.0004	0.0357	0.0070	0.0004	
LGE	t stat	-4.9067	-4.0701	-2.1451	-4.9044	-3.9429	-3.1731	stationary
	Prob	0.0000	0.0038	0.0331	0.0025	0.0053	0.0026	
LOP	t stat	-4.9126	-4.9941	-5.0216	-4.1633	-4.2328	-4.2829	stationary
	Prob	0.0024	0.0004	0.0000	0.0140	0.0026	0.0001	
LM2	t stat	-8.0649	-8.2393	-7.5597	-20.8803	-21.5424	-7.7077	stationary
	Prob	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	

Source: Authors based on Eviews10 outputs.

We notice when the same two tests are performed at the first difference of

the series of the dependent variable and the series of the independent variables under study, as shown in (table. 2) do not contain a unit root, as the critical probability statistical values P at a significant level of 5% when the ADF and PP tests were performed at the first difference in the three models Less than 0.05, which indicates that the absolute values of the t-statistic in all three models are greater than the tabular values, which means rejecting the null hypothesis H_0 which says that there is a unit root and accepting the alternative hypothesis H_1 that denies its existence in a way that confirms the stationary of all time series under study at the first difference, and from it, the integration test of the limits is effective in this case.

2.3.Co-integration testing and estimation of the error correction model

Co-integration tests come in second place in terms of importance after the study of stationary. As the latter gives a preliminary picture about the nature of the models that can be used to estimate the model showing the relationship between economic variables, and considering that all time series are integrated of the same degree (I_1), and the number of observations is limited between 30 and 80 observations, which is one of the conditions for estimating using ARDL (Kalsoom, 2013), and given For its advantage compared to other models because this model is better used in the case of short-term time series, we will try through the systematic sequence of ARDL technique to estimate the proposed model in (equation. 1).

a. **Cointegration test using boundary test:** Co-integration tests according to the ARDL methodology are based on the estimation of the unconstrained models UECM, which will be used to determine the optimal degree of deceleration needed to perform the limits test.

$$y_t = \alpha + \sum_{i=1}^{p} y_i y_{t-i} + \sum_{j=1}^{k} \sum_{i=1}^{q} ß_{ij} x_{j,t-1} + \varepsilon_t$$

Where:

p denotes slowing periods of the dependent variable q1 and q2 denotes periods of slowing down of the independent variables.

Before estimating this model, it is necessary to determine the optimum deceleration degree, using the statistical program eviews10.

Determine the optimal slowdown times After the silence test, we determine the optimal slowdown periods for the variables, based on the Akaike criterion, which shows us in (figure no. 3) the best 20 optimal slowdowns from which we choose the lowest value as follows:

Figure 3. Determining the optimal deceleration periods

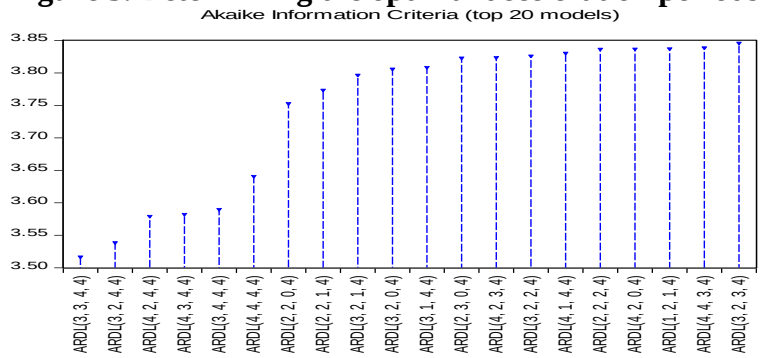


Figure 3 illustrates the model chosen according to the eviews10 program is ARDL(3, 3, 4, 4) This model was chosen based on the Akaike criterion with determining the optimal slowdown periods are three slowdowns for each unemployment rate (UN) Total government spending (LGE), four oil price slowdowns (LOP), and money supply (LM2), from which a boundary test will be conducted.

b. **The results of the test to detect the presence of co-integration using the boundary approach:** To perform the cointegration test for limits, we first estimate the ARDL model, then we will compare the fisher (F) statistic for the limits test with critical values (lowest and highest values). The results of the limits approach test are shown in the following table.

Table 3. Test to detect the presence of co-integration using the boundary approach

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	5.113969	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: Authors based on Eviews10 outputs.

The table3 illustrates the calculated Fisher value (F) is greater than the upper bound value of the values, the criticality of the model is at 5% levels of significance, and therefore we reject the null hypothesis and accept the alternative hypothesis, that is, the variables of the study in Algeria are cointegrated together and there is a long-term equilibrium relationship between them.

c. UECM Unconstrained Error Correction Model: Appendix(1) illustrates the results of the statistical tests of the regression equation, the high quality of the estimated model through the coefficient of determination $R^2 = 0.99$, which is a high percentage, indicating that the explanatory variables (total government spending, oil price, money supply) explain 99% of the changes that occur in the unemployment rate, and the rest are due to other variables and factors that were not included in the study. The results also show that the relationship between the independent variables and the dependent variable the fisher statistical value equals F = 57.03273, which is a significant and its probability equal to 0.000000 less than 5%.greater than the critical values, and therefore the model is significant.

2.4. Autoregressive model estimation of ARDL lags with long-term dynamics

After making sure that there is a long-run equilibrium relationship between the time series, we estimate the parameters of the model is in the long term, as shown in (table 4).

a. Estimation of long-term parameters: The following table shows the results of estimating the long-term parameters of the proposed model.

Table4. Results of estimating the long-term parameters of the proposed model

Levels Equation Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGE	-9.328975	3.745086	-2.490991	0.0344
LOP	-7.721815	2.064047	-3.741104	0.0046
LM2	33.31381	14.18798	2.348031	0.0434
C	-4.921402	29.38090	-0.167503	0.8707

Source: Authors based on Eviews10 outputs

Based on the results of the above table, we can write the unemployment rate model in terms of total government spending, oil prices and monetary mass in Algeria as follows:

$$UN = -9.3290 * LGE \ - 7.7218 * LOP \ + \ 33.3138 * LM2 \ - 4.9214 \ (3)$$

Through the results obtained after carrying out the study, we conclude that: There is a weak inverse effect (negative sign) of LGE total government spending on the unemployment rate, in the long run, whose coefficient was estimated at (-9.3290) and the relationship is statistically significant, and therefore any increase in total government spending by one unit will lead to a decrease in the unemployment rate by 9.32 units. These results are in agreement with the economic theory, and this is what was proven by the studies of "Boulkour Nour El-Din" (Boulkour, 2020), and the study of "Houari Sofiane" and "Naqal Fatima (Houari & Naqal, 2021), where he concluded that there is an inverse relationship between total government spending and the unemployment rate in the long run. These results can be interpreted as follows:

The state's intervention in its spending policy and its provision of aid to institutions and companies may lead them to employing a number of workers, and in crisis situations, providing aid and grants to institutions that are bankrupt or close to bankruptcy is a barrier to preventing workers from being laid off. Keynes and his supporters believe that government spending has a major role in raising aggregate demand in order to increase production, which contributes to reducing unemployment and access On the one hand, full employment.

On the other hand, the almost total dependence on oil revenues to finance the general budget for the state, it makes the economy in a difficult situation, especially in light of fluctuations in oil prices, which limits the effectiveness of government spending in performing its functions.

An inverse relationship between the price of oil and the unemployment rate in the long run, as its coefficient was estimated (-7.721815) and the relationship is statistically significant, and therefore any increase in the price of oil by one unit will lead to a decrease in the unemployment rate by 7.72 units. The study of "Sharqi

Samir", "Qaham Wahiba" and "Fateh Said" (Sharqi, Qaham, & Said, 2020) reached the same results, and it is possible to Interpret these results as follows:

The rise in oil prices is strengthening the position of the hydrocarbon sector, which is considered the main financier, to the public treasury, which increases its revenues and, with that, increases the volume of government spending that can it finances development programs that help open new jobs and raise employment levels, especially in the public sector, and thus reduce unemployment rates without considering the increase in productivity

A direct relationship between the M2 money supply and the unemployment rate in the long run, as its coefficient was estimated at (33.31381) and the relationship is statistically significant, and therefore any increase in the money supply M2 by one unit will lead to a rise in the unemployment rate by 33.31 units, and this contradicts the economic theory that imposes that the relationship be inverse between the money supply and the unemployment rate, and this result is consistent with what was reached To him was a study conducted on Algeria regarding the monetary mass by "Djalit El-Taher" (Djalit, 2017), and this can be traced back to: Interpreting the unemployment rate with a lack of growth and investment to accommodate the huge numbers of job seekers, especially in light of the weakness of the productive sector to meet the increasing demand as the mediator between money supply and the unemployment rate, and this is what we have previously reached in studying the impact of the monetary mass on the rate of economic growth expressed in the growth rate of per capita Of the real GDP, in addition to the spread of the parallel market in the Algerian economy, which leaked a significant amount of money and labor without recording any change in the official rates of unemployment.

b. The results of estimating the ARDL model to correct the error with the dynamics of the short-term ECM: This step includes obtaining the estimations of the parameters in the short term, as shown in appendix (2).The following formula is given for the error correction model based on the results of estimating the long and short-term parameters of this model as follows:

$$\Delta UN = 0.423020\,\Delta UN_{t-1} + 0.573332\Delta UN_{t-2} + 7.522467\Delta LGE + 5.349916\Delta LGE_{t-1} - 3.146965\,\Delta LGE_{t-1} - 1.193654\Delta LOP + 0.520118\Delta LOP_{t-1} + 3.440034\Delta LOP_{t-2} + 3.316233\Delta LOP_{t-3} + 3.430479\Delta M2 - -17.80534\Delta M2_{t-1} - 13.32036\Delta M2_{t-2} - 11.87218\Delta M2_{t-3} - 0.794004\varepsilon_{t-1} + \text{ut} \quad (4)$$

The results of the table show that all short-term coefficients are statistically acceptable at a delay of one year. As for economically, there are some parameters whose values do not correspond to economic theory, such as the parameter of oil price at a delay of (P=2).

It also turns out that the error correction coefficient is acceptable from a statistical point of view because the probability value of the statistical test is less than 5%, and its negative sign corresponds to the economic theory, as it confirms the existence of a long-term relationship between the variables under study, and this coefficient refers to the relationship between the Long and short term, and expresses the speed of return to the equilibrium position in the event of shocks that displace

the Algerian economy from the equilibrium. relationship Its value is CointEq(-1)= -0.794004 that is, when the short-run unemployment rate in period t −1 deviates from long-run equilibrium, 79% is corrected in period t, and the unemployment rate takes about a year It is adjusted towards the equilibrium value (1/0.79 = 1.26) and is corrected once a year after a shock in the model due to a change in the explanatory variables.

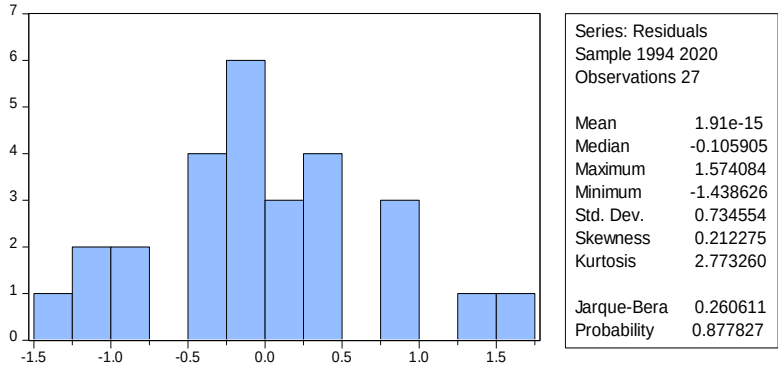
2.5. Model quality and stability tests:

In order to verify the validity of the econometric model, there are a number of Specification tests that are used , the first relates to the quality of the model or diagnostic tests that show that the model is free of econometric problems, and the second shows the stability of the econometric model and the consistency of error correction results in the short to long term.

a. Model quality checks: Model quality checks or diagnostic tests show that the model is free of econometrics problems

.**a.1.The normal distribution of errors:** Test the normal distribution hypothesis for the residuals of the estimate: It is confirmed that the residuals meet the hypothesis of a normal distribution using the Jarque-Bera test, where the null hypothesis indicates that the residuals follow a normal distribution, and using the statistical program eviews10, we get:

Figure4. Test for the normal distribution of residuals of the estimate



Source: Authors based on Eviews10 outputs

The probability of the Jarque-Bera statistic is greater than 5%, and therefore we accept the null hypothesis (H0) the residuals are normally distributed

a.2.A test to detect the problem of autocorrelation: Here we use the Breusch-Godfrey (LM-Test) test to ensure that there is no autocorrelation problem for errors, as the null hypothesis in this case is based on the absence of autocorrelation of errors, and with the help of the statistical program used, the test results can be summarized in the following table:

Table 5. LM . Test Results

Breusch-Godfrey Serial Correlation LM Test:			
Obs*R-squared	0.012556	Prob. F(1,22)	0.9118
	0.016542	Prob. Chi-Square(1)	0.8977

Source: Authors based on Eviews10 outputs

Table 5 illustrates the results of the Breusch-Godfrey test, showed that the probability value of the Fisher test is greater than the 5% level of significance, thus confirming that there is no autocorrelation of errors within the model.

a.3.Variation instability test: The autoregressive conditional variance test (ARCH) is used to detect the possibility of a problem of instability of error variance, so that the null hypothesis indicates that the variance of errors is constant over time, and the test results gave the following:

Table6. ARCH . Test Results

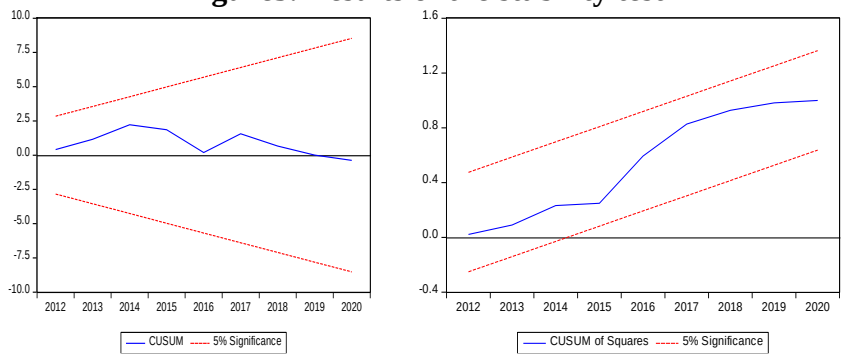
Heteroskedasticity Test: ARCH			
F-statistic	0.604729	Prob. F(1,24)	0.4444
Obs*R-squared	0.639021	Prob. Chi-Square(1)	0.4241

Source: Authors based on Eviews10 outputs.

The results of the ARCH error variance inconsistency test show that the P value of Fisher's test is greater than the 5% levels of significance, and therefore we accept the null hypothesis, , there is no problem of heterogeneity of variance errors in this model.

b. The model stability test: We use the CUSUM test, and the CUSUM of Squares test, to ensure the stability of the econometric model and the consistency of error correction results in the short to long term. The structural stability of the estimated parameters of the error-correction model of the autoregressive time-gaps model is achieved if the graph of the CUSUM and CUSUM of Squares tests falls within the confidence limits.

Figure5. Results of the stability test



Source: Authors based on Eviews10 outputs

Figure 5 illustrates the curve of the cumulative sum of residuals (CUSUM) and the cumulative sum of squares of residuals (CUSUMSQ) are within confidence limits, which indicates that the estimated parameters are constant over time over the study period.

Conclusion

Through this study, we tried to estimate the impact of government spending on the unemployment rate in Algeria during the period (1990-2020), in light of the almost total dependence on oil resources for financing government spending, which is characterized by its continuous fluctuations, using the ARDL model.

Government spending is the tool that the state controls in influencing economic activity, based on the Keynesian approach, which considers that government spending is a catalyst for the national economy. The effect of the multiplier and accelerator, as it is one of the most important effective fiscal policy tools in stimulating aggregate demand, which leads to a corresponding response from the supply side and increases the national output and thus contributes to the high demand for employment, including the employment of labor.

Consequences:

The intervention of the Algerian state with its spending policy and government programs through youth support programs and granting grants to institutions that are bankrupt or close to bankruptcy prevents laying off workers, in addition to providing financial aid to create work spaces as small and medium enterprises in the short or long term, which increases the absorptive efficiency of the national economy To reduce unemployment rates, address the imbalances it suffers from, and achieve economic development;

The weakness of the productive sectors in Algeria, and the establishment of the Revenue Control Fund in 2000 limits, t he impact of the oil price on economic growth, while its impact was positive but weak on the unemployment rate, meaning that the increase in the oil price leads to a decrease in the unemployment rate without regard to the increase in productivity and vice versa.

We concluded that there is an inverse relationship between them, as the increase in government spending led to an impact on the total demand for the operation of the productive apparatus, and consequently the increase in the demand for employment, including the employment of labor, which helps reducing unemployment rates, (according to the economist Keynes). However, its effect remains relative, due to the uncertainty of the public authorities regarding the status of their public policy, as oil revenues are considered the main source for financing the state budget.

The oil industry in Algeria is considered the backbone of economic activity, and this is what makes its economy in permanent danger as a result of the limited oil resources on the one hand, and its price fluctuations related to the conditions of the global oil market on the other hand, which may limit the ability of government spending to respond to changes in economic activity, because oil revenues It is considered the main source of its financing, as it cannot be controlled, so by diversifying its sources of financing and directing it towards the productive sectors to diversify the export basket and the multiplicity of sources of foreign exchange and thus public revenues, it can be activated towards achieving its economic and social goals.

Recommendations

As final recommendations we can say:

- The Algerian government should raise interest in government spending and direct it towards wealth-producing investments and building projects that provide jobs to absorb unemployment and achieve social development and economic balance;
- Education outputs must be linked with the labor market and its requirements, to help the success of combat programs Unemployment, and the development of a comprehensive and coherent policy based on in-depth and specialized studies in order to be able to provide appropriate and effective solutions to meet the real demand for labor;
- The completion of the implementation of public investment programs depends on the availability of funding sources, the government should diversify the economy and search for sources of income outside the hydrocarbon sector, which is sensitive to external changes and global shocks, by encouraging exports outside hydrocarbons, supporting the industrial and agricultural base, and creating a production base to build a sound national economy that is heading towards self-sufficiency in more than one sector, as well as setting a clear policy to ensure Upgrading these exports, which helps to avoid undesirable phenomena such as the "curse of natural resources" or the so-called Dutch disease;
- Improving the efficiency of government spending, which means the need to
- gradually isolate government spending from volatile oil revenues in a way that enhances growth paths and macroeconomic stability;
- The need to introduce methods for evaluating both productivity and spending programs, either before or shortly after implementation, to be processed in a timely manner;
- Strengthening economic governance, starting with eliminating bribery and administrative corruption, and improving transparency oversight mechanisms by expanding the powers of Parliament, with regard to the oversight of public money;
- Rational exploitation of resources and their distribution according to priorities, and striking a balance between investment in capital human money and investment in the productive sectors that represent the added value of the economy, in order to preserve the rights of future generations of this depleted wealth to the optimal utilization of these oil revenues and their transformation into sustainable financial assets;
- Directing and managing the surpluses of the Revenue Control Fund towards productive investments to finance development economic, so that its role is not limited to financing the public budget deficit in the event of a decrease in revenues resulting from the decline in fuel prices and the reduction of debt only;

- Attempting to benefit from the experiences of the oil-producing countries whose policies to diversify their economies have succeeded.

Study prospects

- Estimating the optimal size of government spending and its impact on the unemployment rate in Algeria;
- Other social issues such as unemployment can be addressed.

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Appendices

Appendix1: UECM Unconstrained Error Correction Model Estimation Results

Dependent Variable: UN
Method: ARDL
Date: 01/24/22 Time: 22:34
Sample (adjusted): 1994 2020
Included observations: 27 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): LGE LOP LM2
Fixed regressors: C
Number of models evalulated: 500
Selected Model: ARDL(3, 3, 4, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
UN(-1)	0.629016	0.196693	3.197956	0.0109
UN(-2)	0.150313	0.285208	0.527027	0.6109
UN(-3)	-0.573332	0.234725	-2.442574	0.0372
LGE	7.522467	4.195451	1.793006	0.1066
LGE(-1)	-9.579793	3.938707	-2.432218	0.0378
LGE(-2)	-8.496881	3.810714	-2.229735	0.0527
LGE(-3)	3.146965	3.307371	0.951501	0.3662

LOP	-1.193654	1.434671	-0.832005	0.4269
LOP(-1)	-4.417378	2.140077	-2.064121	0.0690
LOP(-2)	2.919916	2.166577	1.347709	0.2107
LOP(-3)	-0.123801	1.693347	-0.073110	0.9433
LOP(-4)	-3.316233	1.549676	-2.139953	0.0610
LM2	3.430479	4.007168	0.856086	0.4142
LM2(-1)	5.215472	3.755661	1.388696	0.1983
LM2(-2)	4.484978	3.243006	1.382970	0.2000
LM2(-3)	1.448182	3.672485	0.394333	0.7025
LM2(-4)	11.87218	3.952420	3.003775	0.0149
C	-3.907611	23.16421	-0.168692	0.8698

R-squared	0.990803	Mean dependent var	17.50852
Adjusted R-squared	0.973430	S.D. dependent var	7.659407
S.E. of regression	1.248501	Akaike info criterion	3.516485
Sum squared resid	14.02879	Schwarz criterion	4.380377
Log likelihood	-29.47255	Hannan-Quinn criter.	3.773366
F-statistic	57.03273	Durbin-Watson stat	2.780050
Prob(F-statistic)	0.000000		

Source: Authors based on Eviews10 outputs.

Appendix 2. Results of estimating the parameters of the short-term relationship

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UN(-1))	0.423020	0.145685	2.903654	0.0175
D(UN(-2))	0.573332	0.163287	3.511194	0.0066
D(LGE)	7.522467	2.298133	3.273295	0.0096
D(LGE(-1))	5.349916	2.006988	2.665645	0.0258
D(LGE(-2))	-3.146965	1.829204	-1.720402	0.1195
D(LOP)	-1.193654	1.035154	-1.153117	0.2786
D(LOP(-1))	0.520118	1.331927	0.390500	0.7052
D(LOP(-2))	3.440034	1.258304	2.733866	0.0231
D(LOP(-3))	3.316233	1.104962	3.001219	0.0149
D(LM2)	3.430479	2.412971	1.421683	0.1888
D(LM2(-1))	-17.80534	4.137605	-4.303296	0.0020
D(LM2(-2))	-13.32036	3.332095	-3.997593	0.0031
D(LM2(-3))	-11.87218	2.739111	-4.334320	0.0019
CointEq(-1)*	-0.794004	0.130650	-6.077353	0.0002

R-squared	0.853795	Mean dependent var	-0.382222
Adjusted R-squared	0.707590	S.D. dependent var	1.921066
S.E. of regression	1.038816	Akaike info criterion	3.220189
Sum squared resid	14.02879	Schwarz criterion	3.892104
Log likelihood	-29.47255	Hannan-Quinn criter.	3.419985
Durbin-Watson stat	2.780050		

Source: Authors based on Eviews10 outputs.