Effectiveness of Algerian public expenditure policy in raising the agricultural sector performance (econometric study using the ARDL Model during the period 1990-2022)

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Summary: This study focused on the agriculture sector as one of the Algeria's dependent sectors for achieving food sovereignty, diversifying the national economy, and separates its dependence to oil sector. It's analysed the impact of public expenditures as one of the most important tools of fiscal policy on the productivity of Algeria's agricultural sector.

This study use the Auto Regressive Distributed Lag/ARDL model during the period 1990-2022, by considering added value of the agricultural sector as a dependent variable, while public expenditure and money supply were considered as an independent variables.

It found that the impact of public spending on the productivity of agricultural sector has been positive in the long run, with a reverse and insignificant relationship between the money supply and the sector's productivity. For the short term, the model has shown a reverse correlation between the agricultural added value changes and its previous values (-1) and (-2), which explain an impact of other variables on the decision and performance of farmers, and thus causes decreasing in economic performance of agriculture sector, which requires approximately two years and five months to return to equilibrium situation.

Keywords: Public expenditure, added value, economic performance.

Jel Classification Codes : H59; O55.

I- Introduction :

Countries like Algeria, which rely heavily on their hydrocarbon sector have realized the necessity of diversification, especially in light of significant fluctuations of oil prices caused by the worldwide geopolitical conflicts growing. This situation has prompted Algeria to develop other sectors, particularly those have a comparative advantage, which enable the national economy to create high added- value and diversify national production, using idle economic resources like the fertile lands.

Therefore, the agricultural sector is considered as one of the most strategic sectors interested by policymakers, especially concerning their food security strategy in ensuring food availability. This has become a focus goal in the recent economic take-off program outlined by the Algerian state, that target food sovereignty and diversifying the national economy to cover domestic market needs, and support import substitution, while developing exports outside the hydrocarbon sector. Algeria is rich in natural resources, which providing a state that can be used efficiently to develop agricultural sector outputs, enabling Algeria to become the primary supplier to African and Arab countries, given its good diplomatic relationship, as well as supporting the African and Arabic economic integration policies.

However, this can only be achieved by ensuring this sector inputs in terms of quantity and quality, which is evident in term of financial support through the public expenditure policy outlined by the state, as well as the legal and regulatory measures enacted by the supervisory ministry to increase farmers' productivity and investments in various agricultural fields, especially grain and meat production.

I.1.Problem Statement: This study focuses on the effectiveness of fiscal policy, particularly public expenditure, on the economic performance of the agricultural sector in Algeria during the period (1990-2022). The main problem revolves around the following question:

What is the effectiveness of public expenditure policy in enhancing the economic performance of agricultural sector in Algeria?

I.2. Subsidiary Questions:

- Can fiscal policy through public expenditure, improve the performance of the agricultural sector in Algeria?
- What is the impact of public expenditure on agricultural production in Algeria?
- To what extent can state intervention contribute in developing the agricultural sector outputs in Algeria given the available economic resources?

I.3. Hypotheses: To address these questions, the following hypotheses were adopted:

- Public expenditure policy in Algeria can enhance the performance of the agricultural sector through financial support for agricultural investments, without neglecting infrastructure projects supporting this sector.
- Public expenditure in Algeria finances many infrastructure projects addressed to Agriculture sector, thus removing many obstacles to agricultural investment, which evident in the increased levels of agriculture added value.
- Through the functions of resource allocation and equilibrium, the state can improve the performance of the agricultural sector, both quantitative and qualitative frameworks that enhance economic development in Algeria.

I.4. Significance of the Study: The importance of this study lays agricultural position sector in light of the new Algerian economic policy trends, as it constitutes one of the most strategic sectors that have received significant attention from decision-makers, especially in light of the recent economic take-off program, primarily aimed to achieve food security. Subsequently, the

diversification of the national economy in manner to reduce importation bill and encourages economic agents to invest in this sector exchange for numerous privileges granted by the Algerian state to farmers, especially in the south.

I.5. The Study Objectives: This study aims to evaluate the state's efforts through the public expenditure policy pursued in many development programs from 1990 to the present program, directly or indirectly targeting the agricultural sector. It uses added-value data of this sector as a dependent variable, with public expenditure and money supply as independent variables, to assess the effectiveness of development programs outlined by successive governments in improving agricultural production levels during this period.

I.6. Study Boundaries:

I.6.1 Spatial Boundaries: The spatial boundaries encompassed studying the elements of the subject in the Algerian economy, particularly concerning the reality and importance of the agricultural sector in supporting the path of economic development.

I.6.2 Temporal Boundaries: Our study focused on the subject within a time frame extending from 1990 to 2022, which is a significant period in the Algerian economics. During this time, the state adopted many reforms in monetary and fiscal fields, in addition to implementing numerous development programs, especially after the 2000 year.

I.7. Study Methodology: To address the problem and answer the questions posed, and given the importance of the subject, we relied on the descriptive and inductive methodologies. The study included a theoretical aspect illustrating the government's methods through fiscal policy regarding public spending to support the Algerian agricultural sector. We also utilized the inductive methodology consistent with the characteristics of empirical studies, analyzing and interpreting various results related to the studied model's interrelationships in the short and long run. Additionally, we extracted the necessary recommendations for stakeholders in the national economy to enhance agriculture economic performance and corresponding rural development within the national economy.

I.8. Empirical Studies: Several studies have addressed the impact of government support on the agricultural sector and the economy in general, employing various approaches to the subject, and yielding diverse results. These studies can be classified into two main directions:

- The first direction focuses on the positive impact of agricultural sector and its economic efficiency due to efficient agricultural financing.
- The second direction examines the negative impact on productivity and technical efficiency, attributed to the indirect and ineffective allocation of public spending to develop and elevate the sector, relying on revenues outside agriculture, such as oil revenues, especially in developing countries whose economies rely on rentier incomes. Additionally, this direction emphasizes the agricultural sector's need for modernization. Below are the studies that addressed this issue:

Banga(2014) conducted a study on the impact of Green Fund subsidies on productivity and technical efficiency in 26 countries. The study concluded that subsidies increase productivity in both the European Union and the United States. (Banga, 2014)

B.O. Iganiga and D.O. Unemhilin(2017) studied the impact of federal government agricultural spending on agricultural production in Nigeria. They used the Cobb-Douglas growth model, descriptive statistics, and the standard economic data analysis model to extract Long- Run and short- Run dynamic effects on variables determining agricultural production and output value. The study found a positive impact of government spending on agricultural production, but its effect is not immediate. (Iganiga & Unemhilin, 2017)

Taylor and Francis (2018) estimated the effects of public spending and trade on agricultural productivity in China. They presented a production function with constraints to derive more accurate productivity. The results indicated that public spending and exports could effectively improve productivity, while imports have little impact. (Taylor& Francis, 2018)

Al-Zablawi and Shaib(2021) demonstrated the effectiveness of agricultural spending in Egypt by its contribution to the total added-valuein agriculture. This confirms the positive role of government spending in agricultural growth using directed self-regression techniques and relying on production elements according to classical theory. (Al Zabalawi et & Shaib., 2021)

Issa Mohoubi, Mohamed Khaled Mahjoub Abdullah, and Nabil Gandhi (2021) concluded, using the autoregressive distributed lag model, that there is a positive relationship between government spending allocated to the agricultural sector and foreign direct investment in the agricultural sector on agricultural output. (Mohoubi et al., 2021)

Al-Daikha, Abd al-Ali Abu Hawaish, et al. (2021) studied the efficiency of agricultural investment in the agricultural sector by relying on indicators related to agricultural investment expenditure. The study concluded its effectiveness and efficiency. (Al-Daikha et al., 2021)

Al-Ayda, Fawzi Ahmed, and Abdullah Mohammed Jassim (2009) attempted to identify the impact of government investment allocations on agricultural investment in Iraq. They found a weak relationship between investment allocations and agricultural investment due to the lack of direct agricultural support. (Fawzi & Jassim, 2009)

Alaa Mohamed Abdullah and Bashar Mohsen Mohamed (2012) measured the impact of some economic variables on the performance of the agricultural sector in several developing countries, including Egypt, Morocco, Turkey, Indonesia, Thailand, Malaysia, and Tunisia. The results varied between positive and negative depending on the characteristics of the agricultural sector in the country, its economic situation, and the study period. In Egypt, government spending did not affect the sector due to its allocation to other sectors. Also, in Morocco, due to policies reducing agricultural support, the impact of government support was negative. In Thailand, the impact was negative due to the low value granted to the sector. However, in Indonesia, the impact was positive due to the state's adoption of a stimulating policy for the sector with structural changes. (Alaa & Bashar, 2012)

Fatima Rahal and Huda Tawil (2019) concluded in their study that financial resources did not achieve the desired results due to the challenges faced by the agricultural sector in terms of financial feasibility. (Rahal & Tawil, 2019)

I.9. The Theoretical Framework of Public Expenditure Policy:

I.9.1 Definition of Public Expenditure: It is defined as "a cash amount that is spent by a public legal entity for the purpose of satisfying a public need". (Hassan, 2001 p. 11)

I.9.2 Classification of Public Expenditures in Algeria: Expenditures are categorized based on the nature, role, impact, and objectives defined by the state. According to the general budget in Algeria, they are divided into two sections: preparation and management expenditures, which ensure the administrative continuity of state apparatus (Dahmani & Khaleda, 2017 p. 251) . They are as follows: (L'Arabi & Yaakoubi, 2016 p. 204)

a) Management Expenditures: Consisting of four headings specified by Article 24 of Financial Law 17-84, including: public debt burdens and expenses deducted from revenues, allocations of public authorities, expenses related to government agencies' tools, and public interventions. These headings are subdivided into sections that vary according to ministries.

b) Preparation Expenditures: These are investment-oriented expenditures with a positive impact on the Gross National Product (GNP), comprising structural social and administrative investments (Younes and Abu Bakr, 2016, p. 267). They involve allocating resources to equip

sectors with production means according to the state's annual development plan, subdivided into headings, sub-sectors, chapters, and articles.

I.9.3. Economic Effects of Public Expenditure: The effectiveness of public spending is linked to its positive impact, as the effects of public spending on various economic activity variables align with the desired effects to achieve societal goals. Its classifications vary according to the purpose of study. Economically, they can be divided as follows:

First: Direct Effects of Public Expenditure on the National Income: Below, the impact of major expenditures is determined (Marwa Fathi, 2024, pp. 113-121):

a) Impact of Social Expenditures on National Income: These involve transfer payments, which the state provides without receiving any goods or services in return, closer to grants or donations (unemployment benefits, social security assistance, support for the elderly and disabled, etc.). They take two main forms: cash or in-kind. Cash transfers increase individuals' efficiency and transfer purchasing power to those with low incomes. Cash transfers increase consumption demand, indirectly impacting national income. In-kind transfers lead to an increase in goods and services associated with expanding employment, thus raising national income (Al Walid, 2013, p. 72), with varying proportions, higher in in-kind transfers.

b) Impact of Economic Expenditures on National Income: The state provides direct or indirect assistance to public or private sectors in producing essential goods and services to achieve various economic objectives, aiming to stabilize prices of certain goods and services and control their prices, aiming for high production efficiency and high national income (Al Walid, 2013, p. 73).

c) Impact of Military Expenditures on National Income: Providing a stable environment suitable for the production apparatus by harnessing military power to defend against external threats to ensure internal security. Additionally, military expenditures encourage the production apparatus by contributing public expenditures to military production and manufacturing operations. An increase in military expenditures may lead to a balance of payments deficit due to arms imports, and it may also cause economic downturns in various countries, thereby creating negative effects on national income.

d) Impact of Public Expenditures on the Transfer of Production Factors: State spending affects the transfer of ownership of production factors between activities or regions, as follows:

- **Transferring Some Production Elements from One Activity to Another:** Production is directed to meet the needs of society, so the state supports specific activities and transfers production elements to them through financial assistance grants.
- **Transferring Some Production Elements from One Region to Another**: General expenditures are allocated to finance projects in certain areas rather than others to attract investors and consequently transfer production elements to those areas.

e) Impact of Public Expenditures on National Consumption: An increase in expenditure results in an increase in individual income, leading to an increase in aggregate demand accompanied by an increase in production and employment levels. The production capacity must be flexible for public expenditure to have a positive impact on national income.

f) Impact of Public Expenditures on the Redistribution of National Income: The state spends publicly to reduce income disparities, ensure fair distribution, and improve the living standards of individuals across various social strata, especially those with low incomes, through primary income distribution by giving incomes to production factors and secondary distribution to low-income individuals to enhance their productivity and work performance, which has a positive impact on national income (Khadra, 2020/2021, pp. 54-56).

Second: Indirect Economic Effects of Public Expenditures: Indirect effects resulting from public spending are related to the income cycle and are as follows (Mahrazi, 2015, pp. 107-110):

a) Multiplier Effect: When public expenditure increases, a portion of it is distributed to income, part of which turns into consumption and the other part is saved. Consumption generates new income for other groups, and the saved income is directed partly to investment. This process continues, resulting in a multiplier effect, where the increase in production and income is disproportionately higher than the increase in expenditure, known as the multiplier. This is linked to the flexibility and expansion of the production apparatus.

b) Accelerator Effect: Indicates the impact of changes in public expenditure on the volume of investment. The increase in investment resulting from successive increases in demand for the commodity and the relationship between these two increases is expressed as the accelerator. The initial increase in national production allows for a significant increase in investment over time.

I.10. Components and Mechanisms of Supporting the Agricultural Sector in Algeria:

I. 10. 1. Definition of Agriculture: Agriculture is defined as "the science, art, industry, or occupation of cultivating land and raising crops and livestock in productive units for plant and animal production" (Saad Al Arif, 2010).

I.10.2. Components of the Algerian Agricultural Sector:

a) Agricultural Land: Agricultural land is vital for agricultural production. Protecting and enhancing it through effective means of land use ensures efficient utilization and achieves effective performance with lower costs for higher productivity. (Yamina, 2022/2023) Algeria's total area is approximately 238 million hectares, with total agricultural land estimated at 44 million hectares, accounting for 18.5% of the regional area, divided into grazing land (74.5%), non-productive land (6%), and useful agricultural area (19.5%). (Ministry of Agriculture and Rural Development, 2021)

b**) Water Resources:** Water resources are crucial for agricultural sector development, but challenges such as scarcity and inefficient use in developing countries exist. These challenges compel countries, especially developing ones, to enhance water use efficiency in general and agricultural development in particular. (Dahmani & Khaleda, 2017)

c) Human Resources: Algeria relies primarily on human resources for its agricultural production due to a lack of necessary equipment. The efficiency of resource utilization is linked to the efficiency of the human element possessing qualifications that enable them to enhance agricultural production to meet the population's food needs. (Dahmani & Khaleda, 2017)

D) Animal and Plant Wealth: Providing animal and plant wealth is essential for agricultural sector development, aiming to improve the community's welfare through effective investment in these resources while preserving them to ensure their sustainability and ability to provide, consistent with agricultural sector goals, and seeks effective utilization of these production resources by improving the quality of agricultural and food products to meet market requirements (Abed, 2017-2018, p. 16).

I. 10. 3. Mechanisms of Agricultural Support: There are two types of agricultural support in general: direct support and indirect support, as follows (Amrani, 2014-2015, pp. 130-131):

a) Direct Support: Involves providing financial aid, material resources, and cutting-edge technologies directly to relevant entities. It encompasses areas such as land reclamation, support for plant and animal resources, financing, irrigation water use, and technological support.

b) Indirect Support: This type of support includes all supportive services for the agricultural sector, playing a significant role due to its integration with direct support policies. In many cases, investors in the agricultural sector do not need direct financial support but require technical services not easily available to benefit from, including scientific guidance and agricultural crop marketing, as well as agricultural crop insurance.

II– Methods and Materials:

Given that the study aims to analyze and measure the impact of public expenditure on the added-value of agriculture sector in Algeria during the period 1990-2022, we analyzed the expected relationship between several explanatory variables with the dependent variable represented by the added-value of the agricultural sector. To understand this relationship, we need to build a standard model illustrating the nature and type of this relationship.

II.1. Determination of Study Variables and the Model Used:

To build and test the optimal model, it is necessary to use economic measurement methods to demonstrate the relationship between public expenditure and the added-value of the agricultural sector. The study variables are as follows:

Table (1): Study Variables

Sumbol / Indicateur	Y	X_1	X_2
	Agricultural Sector Added-value	Money Supply	Government Expenditure

Source: Researchers' preparation based on Eviews 12 outputs

Assuming a linear relationship between the model variables, the standard model can be written as follows:

$$Y=\beta_0+\beta_1 X_1+\beta_2 X_2+\varepsilon_t$$

II.2. Estimation of the Model:

Before estimating the relationship between the model variables, it is essential to study the stationarity of these variables as a first step, using both the Dickey-Fuller ADF and Phillips-Perron PP tests. The results of these two tests are shown in the table below.

II.2. 1. Study of the Stationarity of Time Series: This study is used to avoid reaching false estimates, which can be explained as follows:

Table (2): Unit Root Test Results for Time Series

Variables		AT Level					
		Test ADF			Test PP		
		With Constant	With Constant & Trend	Without Constant & Trend	With Constant	With Constant & Trend	Without Constant & Trend
y	t-Statistic	-2.8154	-1.0490	4.9314	-3.7938	-2.9504	4.7342
	Prob	0.0677	0.9207	0.9999	0.0071	0.1612	0.9999
X_1	t-Statistic	-3.4991	0.7015	2.6808	-3.3552	1.1295	5.5932
	Prob	0.0146	0.9994	0.9974	0.0205	0.9989	0.9999
X_2	t-Statistic	-1.1905	0.4132	-0.2880	-4.5317	-1.4023	3.9501
	Prob	0.6641	0.9983	0.5733	0.0010	0.8409	0.9999
		AT First Difference					
Variables		Test ADF			Test PP		
		With Constant	With Constant & Trend	Without Constant & Trend	With Constant	With Constant & Trend	Without Constant & Trend
y	t-Statistic	-6.0774	-7.0276	-3.8820	-6.0839	-7.3834	-3.8828
	Prob	0.0000	0. 0000	0.0002	0.0000	0.0000	0.0003
X_1	t-Statistic	-3.7353	-5.0848	-2.1511	-3.6880	-5.0750	-1.5038
	Prob	0.0083	0.0014	0.0323	0.0094	0.0015	0.0498
X_2	t-Statistic	-0.7284	-1.9696	-1.8804	-3.0502	-3.8636	-2.7723
	Prob	0.0345	0.0251	0.0050	0.0142	0.0262	0.0072
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X_2	t-Statistic	-0.7284	-1.9696	-1.8804	-3.0502	-3.8636	-2.7723
	Prob	0.0345	0.0251	0.0050	0.0142	0.0262	0.0072

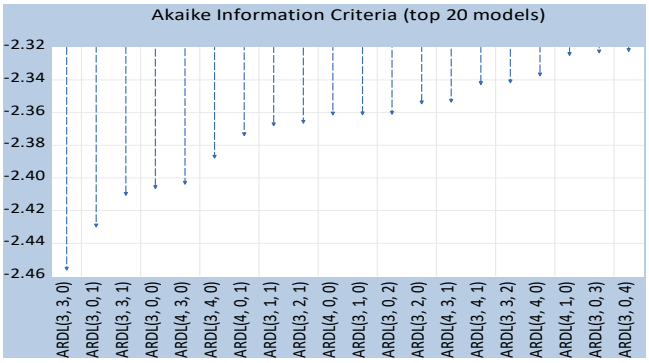
Source: Researchers' preparation based on Eviews 12 outputs

From our analysis of the table results, we find that the series (y), (X1), and (X2) are stationary at the first difference.

II.2.2. Testing for Cointegration: Since the series are stationary at the first difference, we will resort to the ARDL model technique. Therefore, it is necessary to track the steps of this technique as follows:

- ✓ Identifying the optimal lag length for the variables studied according to the Akaike and Schwarz criteria. The results of these criteria are as follows:

Figure (1): Optimal ARDL Model within 20 Selected Models



Source: Researchers' preparation based on Eviews 12 outputs.

From the figure (01), it is evident that the minimum value of the Akaike criterion coincides with the largest column, which intersects with the ARDL model (3, 3, 0).

- ✓ Ensuring the presence of a cointegration relationship using the F-Bounds Test, the results are as follows:

Table (3): F-Bounds Test Results to Confirm the Presence of Cointegration

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	10.05571	10%	2.63	3.35
k	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5
Actual Sample Size	30		Finite Sample: n=30	
		10%	2.915	3.695
		5%	3.538	4.428
		1%	5.155	6.265

Source: Researchers' preparation based on Eviews 12 outputs.

From this table, it is observed that the statistical value of the calculated Fisher (F-statistic=10.05) exceeds the tabulated upper limit value at all confidence levels. Therefore, we can conclude that there is a cointegration relationship between the time series, that allowing us to proceed with estimating the ARDL model.

II. 2.3. Estimation of Long- Run Parameters and Error Correction Model: After confirming the presence of a cointegration relationship between the time series, we can estimate the long and short-run parameters as follows:

a) Estimation of Long- Run Parameters: The results of estimating parameters are according to the following table:

Table (4): Results of Long- Run Parameters Estimation

Levels Equation Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	-0.425418	0.333813	-1.274422	0.2164
X2	1.453600	0.430531	3.376295	0.0029
C	-16.81192	3.435732	-4.893257	0.0001
EC = Y - (-0.4254*X1 + 1.4536*X2 - 16.8119)				

Source: Researchers' preparation based on Eviews 12 outputs

From this model, it is evident that:

- For every unit increase in government expenditure, the added-value of agricultural sector increases by 1.45 units, reflecting the sector's resilience to government expenditure changes in the long run. This indicates a positive indicator of government performance and the effectiveness of fiscal policy in Algeria. However, this performance remains insufficient to achieve self-sufficiency and diversify the national economy's exports as targeted by the recent economic relaunch program.
- The money supply showed a negative relationship, leading to a decrease in the added-value of agricultural sector with its increase, but it was not statistically significant.

b) Estimation of Short- Run Parameters and Error Correction Model: The importance of the error correction model lies to understanding the strength of return to Long- Run equilibrium, especially if disturbances occur in the short term. The results of estimating this coefficient are as follows:

Table (5): Results of Estimating Short- Run Parameters

ARDL Error Correction Regression
Dependent Variable: D(Y)
Selected Model: ARDL(3, 3, 0)
Case 2: Restricted Constant and No Trend
Date: 01/31/24 Time: 23:17
Sample: 1990 2022
Included observations: 30

ECM Regression Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(Y(-1))	-0.317068	0.106989	-2.963552	0.0074
D(Y(-2))	-0.281760	0.105334	-2.674911	0.0142
D(X1)	-0.141343	0.164346	-0.860038	0.3995
D(X1(-1))	-0.153238	0.159519	-0.960626	0.3477
D(X1(-2))	0.225159	0.155481	1.448147	0.1623
CointEq(-1)*	-0.412414	0.060828	-6.780040	0.0000

Source: Researchers' preparation based on Eviews 12 outputs

From the results of estimating short-term parameters, it can be concluded that:

- The coefficient of error correction term is negative (-0.412414) and statistically significant at 1% level. Therefore, any disturbances included in this model are automatically corrected after any deviation (these disturbances may arise from fluctuations in the oil market affecting government expenditure), and this occurs within 2.4 years.

- The lagged values of agricultural sector added-value for one year (t-1) and two years (t-2) have a negative impact on its value at time (t). This represents a significant obstacle to the success of agricultural sector in Algeria, reflected in market imbalances resulting from falling agricultural commodity prices. This had negatively impacted the profitability of many agricultural communities. It necessitates a government response, especially the Ministries of Agriculture and Trade, to set a minimum price level covering production costs to prevent prices from falling below this level, especially during times of agricultural surplus. The government should take measures to export this surplus to foreign markets. For example, as in (07/02/2024), when it was a sharp decline in cauliflower price, with a dropping price less than 10 DZD at the farm gate, while it is over 3 euros in France, more than 50 times higher.

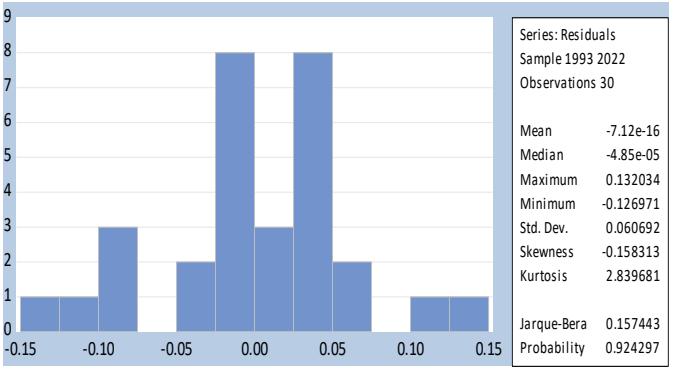
- The insignificance of the money supply's effect on added-value indicates the sector's lack of response to monetary policy measures. This explains the reluctance of farmers to engage in banking products despite the presence of specialized banks such as the Agricultural and Rural Development Bank. This reluctance is often attributed to the Algerian people's adherence to Islamic principles, necessitating the activation of Islamic windows recently established by several Algerian commercial banks to engage farmers in their agricultural investments, especially those utilizing advanced machinery.

- The negative relationship between government expenditure and the added-value of the agricultural sector in the short run, opposite to their relationship in the long run (positive relationship), is due to the sector's non-response to government measures and supported spending policies. This is influenced by other variables not included in this study's model, which have a rapid impact on the sector's performance, such as decreasing rainfall, agricultural electricity issues, shortage of skilled labor, fertilizer and seed costs, and agricultural product price fluctuations.

II.3. Diagnostic Tests for the Estimated Model: Before relying on the above estimated model results, it is necessary to ensure that this model does not suffer from statistical problems.

II. 3. 1. Test for the Normal Distribution Assumption of the Residuals: After estimating this test, the results were as follows:

Figure (2): Test for Normal Distribution of Residuals



Source: Prepared by the researchers based on Eviews 12 outputs.

From this figure, it is evident that the statistical value of Jarque-Bera exceeds 5%, indicating that the residuals follow a normal distribution.

II. 3.2. Test for Autocorrelation of Errors: The results of this test were shown in the following table:

Table (6): Results of LM-test for Autocorrelation of Errors

Breusch-Godfrey Serial Correlation LM Test: Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	2.468313	Prob. F(2,19)	0.1114
Obs*R-squared	6.187120	Prob. Chi-Square(2)	0.0453

Source: Prepared by the researchers based on Eviews 12 outputs.

From the results of this test, it is observed that the probability value of the Fisher test is greater than 5%, indicating the acceptance of null hypothesis, which states that there is no problem of autocorrelation of errors for our ARDL model.

II.3.3. Test for Heteroskedasticity: The Breusch-Pagan-Godfrey test was used to detect heteroskedasticity, and the results were as follows:

Table (7): Results of ARCH Test for Heteroskedasticity

Heteroskedasticity Test: ARCH			
F-statistic	0.358310	Prob. F(1,27)	0.5544
Obs*R-squared	0.379811	Prob. Chi-Square(1)	0.5377

Source: Prepared by the researchers based on Eviews 12 outputs

From the inspection of the table, it is evident that all the probability values of the Fisher tests are greater than the significance levels, indicating the absence of heteroskedasticity problem in the errors variance.

II.3.4. Test for Adequacy of Functional Form of the Model: The Ramsey Reset test was used to determine the functional form of the model, and the results were as follows:

Table (8): Results of Ramsey Reset Test

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: Y Y(-1) Y(-2) Y(-3) X1 X1(-1) X1(-2) X1(-3) X2 C

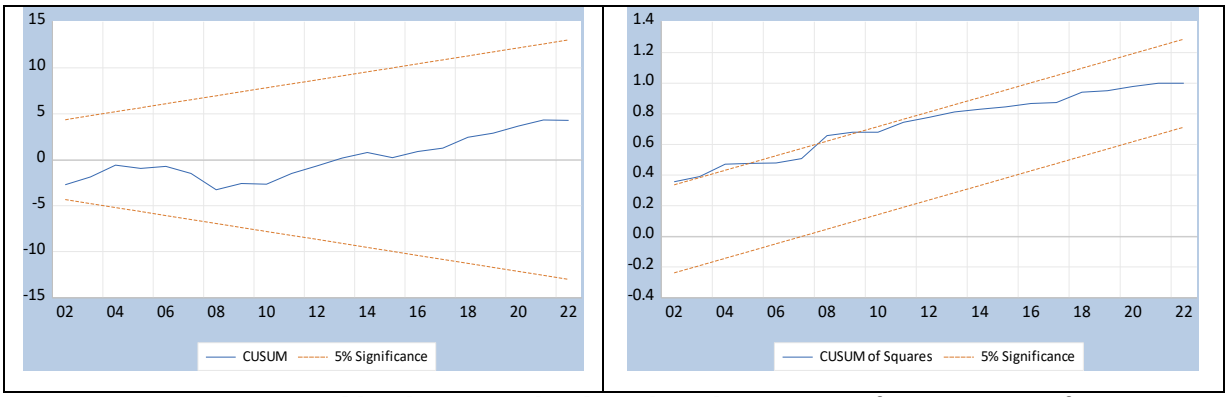
	Value	df	Probability
t-statistic	1.550135	20	0.1368
F-statistic	2.402918	(1, 20)	0.1368
Likelihood ratio	3.403769	1	0.0650

Source: Prepared by the researchers based on Eviews 12 outputs

The calculated Fisher value (F=0.1.55) is less than the tabulated value at all confidence levels known. Therefore, we accept the null hypothesis, indicating that the linear form is suitable for the proposed ARDL model.

II. 3. 5. Test for Structural Stability of the Model: To test the structural stability of the model, the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) tests were conducted, and the results were as follows:

Figure (3): Results of the Structural Stability Test for the Model



Source: Prepared by the researcher based on the outputs of Eviews 12 software.

From Figure (3), it can be observed that the cumulative sum of residuals (CUSUM) and the cumulative sum of squared residuals (CUSUMSQ) fall within the confidence bounds, confirming the stability of this model.

III- Results and discussion :

Starting from the regression equation extracted from the results of estimating the Long- Run parameters:

$$y = -16.81192 - 0.425418x_1 + 1.453600x_2$$

The results of the regression equation confirm the acceptance of the first hypothesis, which states that the public expenditure policy adopted by the Algerian governments, aimed at stimulating agricultural investment within several projects targeting agricultural development and thus economic development. This is because for every unit increase in public expenditure, the added-value increases by 1.453 units.

This is consistent with the logic of many economic theories considering public expenditure as one of the components of aggregate demand. Therefore, an increase in expenditure corresponds to an increase in the production of goods and services (demand creates supply). Public expenditure directed towards agricultural projects, resulting in net increases in the value of agricultural production, i.e., added-value to the agricultural sector.

Thus, it contributes to determining the level of economic performance of the agricultural sector and consequently the national economy. This is particularly relevant for the national economy that harnesses significant and distinctive natural resources related to vast land areas, quality agricultural lands, geographical location, and moderate climate, all of which increase the productivity of this sector and consequently raise the level of real economic growth. This is the conclusion reached by the majority of studies (Anriquez et al., 2016) and (Briamonde et al., 2023).

IV- Conclusion:

The agricultural sector is one of the most important sectors relied upon globally, especially given the current geopolitical circumstances (the Russo-Ukrainian conflict). This conflict has underscored the importance for countries like Algeria to achieve food security with their local capabilities, and each economy's natural resources exploitation.

Considering Algeria as one of the countries relied upon to achieve food security, with its enormous natural resources enabling it to achieve food sovereignty and potentially access food markets globally, especially in the Arab world and African countries, our study has yielded important results showing the importance of state intervention through its sovereign functions, especially in resources allocation. Through this work, the following points have been highlighted:

- ✓ The Algerian public expenditure policy adopted in the long run (government expenditure coefficient = 1.45), contributes in agricultural production level improving. However, the supervising ministry (especially directorates at the local level) is inadequate in enhancing the share of added-value of agricultural sector in the gross domestic product (due to suboptimal utilization of natural resources, especially).
- ✓ The flexibility of this sector remains weak, especially in the short run, indicating no effect of government expenditure on the added-value of agricultural sector, given the importance of many other variables affecting the agricultural production system in the short term, whether related to the inputs of this sector and linked to the abundance of specialized labour, water, raw materials, especially in terms of seed quality, fertilizers, advanced equipment, agricultural electricity, agricultural channels, livestock feed production and distribution, or with the production process itself, which requires significant resources (knowledge, material), or even with the outputs of this sector, which are sometimes plagued by problems related to speculation, the decline in prices of some agricultural products below than the cost price, especially in their seasons, the lack of channels for diverting production surpluses to global markets.
- ✓ The perception of society regarding investment in the agricultural sector, dominated by perceptions that is tiredness, traditional, and economically unprofitable, has negatively impacted the level of investment in this sector, especially with the development of commercial activity starting in the early 2000s, dominated by importation in covering a large portion of the national market needs for goods and services, which presented, for capital owners, a profitable opportunity with less effort and risk compared to efforts made to support agricultural production through the creation of specialized funds and departments providing many services, but within a framework tainted by administrative and financial corruption.
- ✓ Algeria's possession of vast natural resources, evident in the vast agricultural lands suitable for cultivation, including the desert region, strategic location, and moderate climate, constitute the most important components for the success of agricultural sector in Algeria. However, optimal utilization within a framework that coordinates all agricultural sectors (vegetables, fruits, grains, animal production, etc.) is necessary.

This leads us to propose a set of recommendations, including:

- ➢ Emphasising to the geographical distribution of agricultural activities according to the specialization that qualifies each geographical region for a specialized agricultural sector or activity (North, highlands, and south).
- ➢ Encouraging training in agricultural specialties in universities and vocational training centers, by qualifies human resources for more efficient agricultural activities, especially if absorbed directly into projects after graduation.
- ➢ Providing all necessary infrastructures for agricultural investments, especially agricultural electricity, well drilling, dam construction, and cleaning existing ones to increase water volume, breaking the isolation of agricultural investments by increasing the number of agricultural channels and connecting them to the local and national road network, establishing banks specializing in seeds, without neglecting the supported infrastructure for food supply chains.

- Supporting investors with halal financing formulas that integrate traditional banking and Islamic financial institutions in participatory financing in the agricultural sector, which creates efficiency in choosing profitable agricultural projects.
- Accompanying farmers through field inspection visits conducted by agricultural authorities, to inspect their crops, listen to their concerns, and address them, especially concerning the production process inputs and outputs.
- Establishing offices specialized in agricultural products for export with global standards, where farmers can deliver high-quality products with prior training utilizing the state's good diplomatic relations with countries worldwide.

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