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The relationship between public finance governance indicators and public expenditure rationalization in Algeria during the period (1996-2023): an empirical study

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Abstract:

This paper aims to examine the relationship between global financial governance indicators and public expenditure rationalization in Algeria during the period (1996–2023), using annual data and relying on the ARDL model to test the existence of a long- and short-term relationship between the study variables. The study found a cointegration relationship between the contribution of public expenditure to GDP (EXP/GDP) and global financial governance indicators, as indicated by the results of the bound test approach for cointegration through the calculated F-statistical value, which was greater than the upper critical limits at a significance level of 10%. The study also indicated a strong positive effect of the government effectiveness index and the Voice and Accountability index on the contribution of public expenditure to GDP in the long run, and a negative effect of both the Regulatory Quality index and the control of corruption index on the contribution of public expenditure to GDP in the long run.

Key words: Financial governance indicators, rationalization of public expenditures, general budget, ARDL Model.

JEL Classification: H11, H50, O55, C01.

Introduction:

Most countries strive to develop their management systems in order to keep pace with developments in various fields, including the economic field, especially in light of financial collapses, global crises, financial pressure, and stagflation. As a result of weak mechanisms for implementing and achieving transparency and accountability, and the absence of effectiveness and efficiency in performance, governments have been driven to introduce development mechanisms through which they manage their sectors, particularly the public sector. Among these mechanisms is governance, which is considered one of the most important modern mechanisms that has received considerable attention in recent years from many international organizations and institutions, including the World Bank, the International Monetary Fund, and the Organisation for Economic Co-operation and Development. Accordingly, governance has become one of the most important tools supporting the achievement of development in countries.

With the worsening of the general state budget deficit as a result of the inability of public revenues to cover the continuously increasing public expenditures, in the absence of sustainable financing resources, and the resulting negative repercussions on the national economy, attention to the rationalization of public expenditures has become a matter of great importance, as it contributes to reducing the general budget deficit. This is achieved through controlling and rationalizing public spending, as well as combating extravagance and waste, in a manner that ensures the optimal allocation of various resources.

What has been observed at the level of the Algerian economy is that, like other developing countries, it suffers from a persistent deficit in its general budget and witnesses a steady increase in public expenditure rates. This has required the adoption of reform and rationalization policies for public expenditures, and the rational and sound exploitation of available resources, in a way that contributes to the development of government spending programs and works toward achieving financial sustainability for the Algerian government.

Study problem: In light of the above, the study problem revolves around answering the following main question:

To what extent do financial governance indicators affect the rationalization of public expenditures in Algeria during the period (1996–2023)?

Sub-questions: To answer the main question, the following sub-questions were formulated:

- Is there a relationship between financial governance indicators (voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality and its enforcement, rule of law, and control of corruption) and the rationalization of public expenditures in Algeria during the period (1996–2023)?
- Is there a long-run equilibrium relationship between financial governance indicators and the rationalization of public expenditures in Algeria during the period (1996–2023)?

Study hypotheses:

As a preliminary answer to the main question and the sub-questions, the following hypotheses were formulated:

• There is a relationship between all financial governance indicators collectively and the rationalization of public expenditures in Algeria during the period (1996–2023).

• There is a long-run equilibrium relationship between financial governance indicators and the rationalization of public expenditures in Algeria during the period (1996–2023).

Importance of the study:

This study derives its importance from addressing a highly significant topic in the economic field, namely the issue of the impact of governance indicators on the rationalization of public expenditures in Algeria during the period (1996–2023). Accordingly, this topic has been highlighted due to its great importance, given the steady increase in public expenditures in the Algerian economy and the inability of public revenues to keep pace with this increase. Thus, through its results and recommendations, this study may contribute to assisting decision-makers in strengthening the application of financial governance indicators in various state institutions as a mechanism for rationalizing public expenditures.

Study methodology:

In order to cover the various aspects of the above issue, the descriptive and analytical approach was used, through which an attempt was made to examine the theoretical foundations of financial governance indicators and the rationalization of public expenditures. Econometric analysis was also used to cover the applied aspect of the study.

Study structure:

This study was divided into two main sections:

First section: The conceptual framework of financial governance indicators and the rationalization of public expenditures.

Second section: A study of the relationship between all financial governance indicators collectively and the rationalization of public expenditures in Algeria during the period (1996–2023).

First section: The conceptual framework of financial governance indicators and the rationalization of public expenditures.

1. The concept of public finance governance:

The term governance (Gouvernance) emerged at the beginning of the 1990s within a set of ideas calling for a society based on law, responsibility, transparency, exchange, respect for diversity, and its development. The concept of governance refers to the activity carried out by management in a sound and prudent manner. Given the widespread use of this concept and its association with many economic, social, legal, and political fields at both the macro and micro levels, and in both the public and private sectors, there is still no consensus on a single definition.

1.1. Definition of public finance governance:

Governance in the public sector is defined as a set of legislation, procedures, policies, organizational structures, and controls that influence and shape the way a government entity is directed and managed to achieve its objectives in a professional and ethical manner, with integrity and transparency, according to monitoring and evaluation mechanisms and a strict accountability system to ensure efficiency and effectiveness of performance on the one hand, and the equitable provision of government services on the other hand (Madfouni, 2022, p. 620).

The World Bank defined it as: “the manner in which power is exercised in the management of a country’s economic and social resources for the purpose of development.”

1.2. Objectives of public finance governance:

The issue of public sector governance, particularly with regard to public finance governance, is of great importance in order to achieve what governance stipulates in terms of transparency, participation, and accountability, and thus achieve the objectives of public policies, especially developmental ones. Since the budget is a contract between citizens and the state that determines how resources are raised and allocated to provide public services, international organizations and institutions, such as the Public Sector Governance Committee and the Organisation for Economic Co-operation and Development, as well as, more broadly, international budget specialists, have sought to establish a set of practices and principles that provide clear guidelines for developing,

implementing, and improving budget systems to address future challenges. This aims to provide a useful reference tool for decision-makers in countries and stakeholders to use wisely in order to improve citizens' lives and thus achieve public budget governance (Massoudi et al., 2016, p. 9).

1.3. Financial governance indicators in the public sector, through which the quality of governance in the public sector can be measured (Kaufman, Aart, & Massimo, 2011):

•**Voice and Accountability:** This indicator measures the extent to which citizens participate in selecting their governments, freedom of expression, public action and media, and the participation of all members of society in decision-making through institutional channels that enable society to express its opinion in the decision-making process. It ensures freedom of opinion and expression and the basic standards of human rights, and that all officials and decision-makers in the state are subject to the principle of accountability before public opinion and its institutions without exception (Ben Sheikh & Khouathra, 2020).

•**Political Stability and Absence of Violence:** This indicator measures the following concepts: the emergence of instability, armed conflict, terrorist threats, internal conflict, fragmentation of the political class, or constitutional changes or military coups (Mohamed El-Najjar, 2023, p. 57).

•**Government Effectiveness:** This indicator measures the effectiveness of managing state institutions and their efficiency in employing national resources in a sound and clear manner that serves society, as well as the state's ability to serve the public interest. It includes the management of public funds and the ability to manage resources and implement policies effectively (Daqish, Qara, & Mazouri, 2019).

•**Regulatory Quality:** This indicator measures the following concepts: the occurrence of political interventions in market freedom, such as price controls, unrealistic supervision of banks, and excessive regulation in the areas of foreign trade and business establishment (Boudjemaa & Ben Qana, 2017).

•**Rule of Law:** This indicator measures the extent of individuals' confidence in the legal rules governing society, and highlights concepts related to trust in societal rules, particularly contract enforcement and property rights, as well as the likelihood of crime and violence (Rizki & Miehoub, 2019).

•**Control of Corruption:** This indicator measures the ability of public authority to curb large and small personal gains, as well as to limit the control of elites and vested interests over state capacities (Abu Ziada & Abdel-Muati, 2021).

2. The conceptual framework of rationalizing public expenditures:

The process of rationalizing public expenditures is considered an important and necessary step to avoid extravagance and waste of public funds, and thus to prepare the general budget in a more rational manner.

2.1. Definition of rationalizing public expenditures:

The term rationalization of public expenditures derives its meaning from the concept of "rationality" in its economic sense, which refers to the rational and prudent management and spending of funds on a sound basis. Rationalizing public expenditures includes controlling and tightening oversight over them, minimizing waste and extravagance, avoiding unnecessary expenditures,

increasing productive efficiency, and seeking to make the optimal use of economic and human resources (Abbad, 2019–2020, p. 100).

2.2. Objectives of rationalizing public expenditures:

The process of rationalizing public expenditures aims to achieve the following:

- Reducing the gap between available revenues and required expenditures, lowering the deficit in the state's general budget, helping to control inflation and public debt, and contributing to the reinforcement, replacement, and renewal of infrastructure projects.
- Reviewing the expenditure structure by reducing the volume of expenditures that do not achieve significant returns (Al-Lahiyani, 2022, p. 696).
- Assisting in assessing the productivity and effectiveness of public expenditures in providing public services.
- Avoiding the risks of current indebtedness and its future effects, especially since most developing countries suffer from difficulties in servicing debts that may have resulted from excessive borrowing in the past.
- Driving development and growth and overcoming the economic and social problems facing the state.
- Protecting society from the risks of economic and political dependency and other risks by helping to strengthen national capacities for relative self-sufficiency in the long term.
- Combating extravagance, waste, and all forms and manifestations of misuse of authority and public funds.
- Raising economic efficiency in the use of available resources and capacities.
- Improving current production methods and introducing modern and technical approaches in public management (Riyash, 2015–2016, p. 41).

2.3. Main areas concerned with rationalizing public expenditures:

There are several areas in which public expenditures can be rationalized, including the following:

2.3.1. Rationalization of wages and salaries:

The World Bank considers wages and salaries to constitute a large share of total public expenditure, due to the large number of public employees working for the state across its various institutions. In order to increase efficiency in these institutions, it is often necessary to dismiss a large proportion of employees or resort to wage reductions, in addition to freezing public sector recruitment. It can be said that although such measures may reduce the wage and salary burden in the general budget of some countries, they have negative effects, including the emergence of unemployment. Moreover, these measures deepen economic recession, as wage reductions and layoffs reduce workers' incomes and thus limit their spending, which directly leads to a reduction in aggregate domestic demand, negatively affecting production and investment (Zaki, The Explosion of the Deficit: Treating the State General Budget Deficit in Light of the Contractionary and Developmental Approaches, 2000, p. 186).

2.3.2. Rationalization of investment expenditures:

Public investment expenditures play a prominent role in economic development, especially when directed toward infrastructure sectors. Therefore, any measures aimed at rationalizing public expenditures should not negatively affect the level or productivity of public investment spending

(Asfour, 2011, p. 401). Among the most important measures and actions aimed at rationalizing public expenditures in this area are the following:

- Giving priority to low-cost projects with quick financial returns.
- Reducing non-essential elements in government projects, such as decorations and embellishments that require high costs.
- Transferring the implementation and management of certain economically oriented projects to the private sector.
- Strengthening financial oversight over spending operations, particularly with regard to costs and procurement.

2.3.3. Rationalization of operational expenditures:

Among the key points that should be focused on in rationalizing operational expenditures are the following:

- Seeking ways to reduce the rents of buildings leased by the state to the lowest possible level and studying alternative, lower-cost options.
- Discontinuing the use of leased buildings for government agencies that are non-essential or secondary to the state's core activities.
- Reducing expenditures related to hosting and participating in international exhibitions.
- Maximizing the use of equipment, machinery, furniture, and vehicles by extending their service life as much as possible through adequate maintenance and preservation (Dardouri, Budget Policy in Treating the State General Budget Deficit: A Comparative Study of Algeria and Tunisia, 2013–2014, p. 141).

From the above, it can be concluded that the state must rationalize public expenditures in all these areas in order to reduce their volume and lower the deficit in the general budget.

Second section: Studying the relationship between financial governance indicators and the rationalization of public expenditures in Algeria during the period (1996–2023)

1. Study methodology:

In order to study the relationship between financial governance indicators (voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality and its enforcement, rule of law, and control of corruption) and the rationalization of public expenditures in Algeria during the period (1996–2024), we use the Autoregressive Distributed Lag Model (ARDL), also known as the Bound Testing Approach, introduced by Pesaran et al. (2001). To carry out the different stages of the applied study, the statistical software (Eviews12) was used. The annual data used to estimate this model were obtained from the World Bank database entitled World Development Indicators (WDI) for the dependent variable, represented by the ratio of government expenditure contribution to GDP (EXP/GDP). As for the financial governance indicators, the data were obtained from the World Bank database entitled World Governance Indicators (WGI).

2. Model specification and presentation of study variables:

This study relies on a multiple linear model to determine the extent of the impact of financial governance indicators on the rationalization of public expenditures in Algeria during the period (1996–2023), where the ratio of government expenditure contribution to GDP (EXP/GDP) is a

function of financial governance indicators. The econometric model of the study is specified as follows:

$$EXP/GDP_{ti} = \alpha_0 + \alpha_1 VA_{t1} + \alpha_2 PS_{t2} + \alpha_3 GE_{t3} + \alpha_4 RQ_{t4} + \alpha_5 RL_{t5} + \alpha_6 CC_{t6} + \mu_t \ldots\ldots (1)$$

Where:

t: represents the number of observations (corresponding to the years of the study period (1996–2023)).

(EXP/GDP): represents the dependent variable, which refers to the ratio of public expenditures to gross domestic product.

- As for the independent variables, they represent the global governance indicators collectively, which are measured as follows:

(VA: Voice and Accountability): voice and accountability.

(PS: Political Stability and Absence of Violence): political stability and absence of violence.

(GE: Government Effectiveness): government effectiveness.

(RQ: Regulatory Quality): regulatory quality and its enforcement.

(RL: Rule of Law): rule of law.

(CC: Control of Corruption): control of corruption.

μt: the error term.

α_0: the constant term.

α_1, α_2, α_3, α_4, α_5, α_6: represent the response coefficients of the dependent variable to the independent variables, respectively.

3. Discussion and analysis of results:

3.1. Study of time series stationarity:

Before estimating the model, it is necessary to study the stationarity of the time series in order to avoid the problem of spurious regression. The latter yields good results when conducting tests, as the coefficient of determination (R^2) is high and one or more regression coefficients are statistically significant based on the usual Student and Fisher tests (Damodar, 2012, p. 234), but it does not provide a true meaning to the results. To test stationarity, unit root tests are used, among the most important of which is the Augmented Dickey–Fuller (ADF) test. The second test is the Phillips–Perron (PP) test (Bourbonnais, 2015, pp. 268–269–272). Table (01) presents the results of the Augmented Dickey–Fuller test.

Table (01): Results of the Augmented Dickey–Fuller (ADF) test

Variables	At level			At 1st Difference			Order of integration
p-value	Intercept	Trend and intercept	None	Intercept	Trend and intercept	None	
	p-value			p-value			
(EXP/GDP)	0,3978	0,8993	0,5760	**0,0003**	0,0011	0,0000	I(1)
(VA)	**0,0001**	0,0202	0,6525	-	-	-	I(0)
(PS)	0,0797	**0,0357**	0,6528	-	-	-	I(0)
(GE)	**0,0012**	0,0119	0,5414	-	-	-	I(0)
(RQ)	0,6560	0,4529	0,4436	**0,0406**	0,01619	0,0027	I(1)
(RL)	**0,0074**	0,00343	0,0515	-	-	-	I(0)
(CC)	**0,0096**	0,0050	0,3118	-	-	-	I(0)

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

We conclude from Table No. (01) that the time series of the Regulatory Quality and its Implementation index (RQ) is non-stationary at level, since the value of (prob) is greater than the significance level (5%), meaning that the time trend is not significant. Accordingly, we accept the null hypothesis (H0: the series is non-stationary) and reject the alternative hypothesis (H1: the series is stationary). After taking the first difference of the time series, the results show that the value of (prob) becomes less than the significance level (5%), indicating that the time series becomes stationary at the integration order I(1).

The results also indicate that the remaining public financial governance indicators (CC, RL, GE, PS, VA) are stationary at level I(0), since (prob) is less than (5%). Moreover, the dependent variable represented by the ratio of public expenditure to gross domestic product (EXP/GDP) becomes stationary after taking the first difference, that is, at the integration order I(1). To verify the results of the stationarity test, we deemed it appropriate to conduct another stationarity test, namely the Phillips–Perron (PP) test, whose results are presented in Table No. (02).

Table (02): Results of the Phillips–Perron (PP) Test

Variables	At level			At 1st Difference			Order of integration
p-value	Intercept	Trend and intercept	None	Intercept	Trend and intercept	None	
	p-value			p-value			
(EXP/GDP)	0,4144	0,9140	0,5847	**0,0003**	0,0006	0,0000	I(1)
(VA)	**0,0065**	0,0130	0,7661	-	-	-	I(0)
(PS)	0,0929	**0,0345**	0,7917	-	-	-	I(0)
(GE)	**0,0012**	0,0097	0,6488	-	-	-	I(0)
(RQ)	0,5331	0,6278	0,3724	**0,0006**	0,0043	0,0000	I(1)
(RL)	0,0068	0,0311	0,6512	-	-	-	I(0)
(CC)	**0,0062**	0,0036	0,4821	-	-	-	I(0)

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

We note from the above table that results identical to those of the Augmented Dickey–Fuller (ADF) test were obtained. It was found that the time series of the public financial governance indicators (CC, RL, GE, PS, VA) are stationary at level I(0). As for the Regulatory Quality and its Implementation index (RQ), it is stationary after taking the first difference I(1), since the value of (prob) is greater than 5% at level and becomes less than (5%) after differencing. With regard to the variable representing the ratio of public expenditure to gross domestic product (EXP/GDP), it is stationary after taking the first difference, that is, at the integration order I(1), since the value of (prob) is greater than 5% at level.

Accordingly, we conclude that the stationarity of the time series is a mixture of I(0) and I(1), with no second difference, and that the dependent variable (the ratio of public expenditure to gross domestic product (EXP/GDP)) is stationary at the first difference. Therefore, the condition for using the ARDL model to estimate the relationship is satisfied.

3.2. Estimation of the study model:

In order to conduct the cointegration test, it was necessary to estimate the ARDL model. As shown in Table No. (01) (see the list of appendices), the ARDL model, which determines the optimal lag length automatically according to the Akaike Information Criterion (AIC), concluded that the optimal number of lag periods for the dependent variable (EXP/GDP) is two time periods (2). As for the independent variables (CC, RQ, RL, GE, PS, VA), their lag lengths are respectively (1, 2, 2, 2, 0, 0). T he statistical results also showed that the coefficient of determination ($R^2 = 0.9189$) indicates that the independent variables explain 91.89% of the variations occurring in the dependent variable represented by the ratio of public expenditure to gross domestic product (EXP/GDP), while the remaining percentage (8.11%) is attributed to other variables that were not included in the estimated regression model.

3.3. Cointegration test using the Bounds Test approach:

This step consists of testing the existence of a cointegration relationship or a long-run equilibrium relationship between the dependent variable (inflation rate) and the independent variables. To verify the existence of a cointegration relationship among the study variables, we resort to the Bounds Test, whereby the calculated F-statistic for the long-run parameters is compared with the tabulated F-values at the significance levels (1%, 2.5%, 5%, 10%), as shown in the table below.

Table (03): Results of the cointegration test using the Bounds Test methodology

ARDL Bounds Test Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	540807.3	6
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

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

Based on the results shown in Table No. (03), we observe that the calculated F-statistic (F stat = 3.540807) is greater than the upper bound critical values (I1 Bound) of Pesaran at the 10% significance level. Accordingly, we reject the null hypothesis (H0: there is no long-run equilibrium relationship running from the set of explanatory variables toward the dependent variable (the equation is not cointegrated)) and accept the alternative hypothesis (H1). Therefore, we conclude that there is cointegration, which represents a long-run equilibrium relationship among the study variables in the long term.

3.4. Estimation of the long-run and short-run models using the ARDL model:

Since the results confirmed the existence of a cointegration relationship among the variables, this requires estimating the long-run equilibrium relationship (see Appendices: Table No. (02)). Accordingly, the long-run and short-run models are estimated using the ARDL model.

Table No. (04): Results of the long-run relationship test for the ARDL model

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GE	0.970707	0.254086	3.820381	**0.0034**
PS	0.117440	0.172917	0.679169	0.5124
RL	-0.258204	0.229273	-1.126183	0.2864
RQ	-0.487266	0.088647	-5.496717	**0.0003**
VA	0.731650	0.323396	2.262392	**0.0472**
CC	0.838451	0.277472	-3.021754	**0.0129**
C	7.987925	5.010653	1.594189	0.1420

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

The results shown in the above table indicate the following:

- The results of the long-run relationship test for the ARDL model indicate the statistical significance of the following public financial governance indicators: Government Effectiveness (GE) and Voice and Accountability (VA), with positive signs and statistical significance at the 5% level, where (prob = 0.0034) and (prob = 0.0472), respectively. This indicates that, in the long run, the Government Effectiveness index (GE), the Regulatory Quality and its Implementation index (RQ), the Voice and Accountability index (VA), and the Control of Corruption index (CC) positively and effectively affect the ratio of public expenditure to gross domestic product in Algeria. An increase of 1% in these public financial governance indicators leads to an increase in the ratio of public expenditure to gross domestic product in Algeria by 3.4% and 4.72%, respectively, in the long run.
- On the other hand, the Regulatory Quality and its Implementation index (RQ) and the Control of Corruption index (CC) were found to have a negative and statistically significant effect on the ratio of public expenditure to gross domestic product, since the Fisher statistics were respectively (prob = 0.0003) and (prob = 0.0129), which are less than the 5% significance level. Accordingly, an increase of 1% in these two indicators leads to a decrease in the ratio of public expenditure to gross domestic product in Algeria by 0.03% and 1.29%, respectively.
- As for the remaining public financial governance indicators, namely Political Stability and Absence of Violence (PS) and Rule of Law (RL), the results showed that they are not statistically significant at the 5% significance level, with Fisher statistics of (prob = 0.5124) and (prob = 0.2864), respectively, both of which are greater than the 5% significance level. Thus, political stability and absence of violence, as well as the rule of law index, do not affect the ratio of public expenditure to gross domestic product in the long run.
- **Evaluation of the short-run model:**

With regard to the short-run equilibrium relationship, the results show that the value of the error correction coefficient (CointEq(-1)) is (-1.4020), with a negative sign and statistical significance, as the value of (prob = 0.0009) is less than the 5% significance level. This confirms the

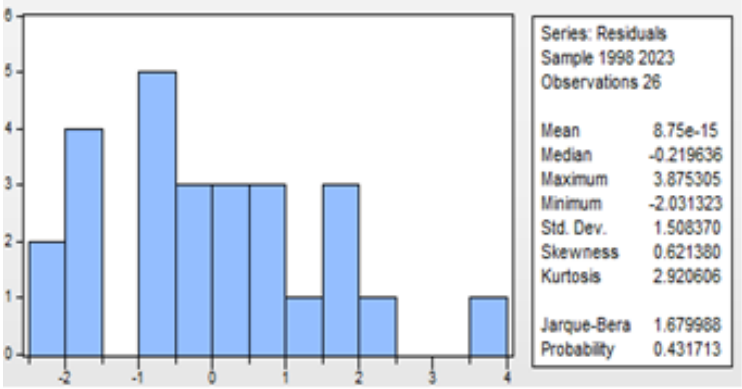
existence of a long-run equilibrium relationship among the study variables. The value of the error correction coefficient also indicates that 1.4020% of the deviation of the ratio of public expenditure to gross domestic product (EXP/GDP) in the previous year from its long-run equilibrium value can be corrected during the current period (t) in order to return to the long-run equilibrium position (the existence of a mechanism for transition from the short run to the long run). This also indicates the existence of an equilibrium relationship among the studied variables in the short run.

3.5. Model diagnostics:

- **Normality test of residuals:**

To verify the assumption that the residuals of the estimated model follow a normal distribution, the Jarque–Bera test is used. From Figure No. (01) below, we note that the Jarque–Bera probability (J-B Probability = 1.679988) is greater than 5%, and therefore we accept the null hypothesis (H0: the residuals of the model follow a normal distribution).

Figure No. (01): Results of the Jarque–Bera Test



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

- **Test for the problem of serial correlation among residuals:**

In order to verify the assumption of residual independence, the Breusch–Godfrey test for serial correlation is used. The results, presented in Table No. (05) below, show that the test value (F = 0.1675) has a probability greater than the 5% significance level. This indicates the goodness of the estimated parameters and confirms that there is no problem of serial correlation among the residuals of the estimated multiple linear regression model.

Table No. (05): Results of the test for serial correlation of residuals (LM Test)

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	27.92611	Prob. F(2,8)	0.1675
ObsR-squared	22.74248	Prob. Chi-Square(2)	0.0529

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

- **Test for heteroskedasticity of residuals (error variance):**

There are several tests used to detect the stability of the variance of residuals, among which is the Breusch–Pagan–Godfrey test. This test is based on two competing hypotheses:

H0: There is no problem of heteroskedasticity in the error term.

H1: There is a problem of heteroskedasticity in the error term.

The results of this test are shown in Table No. (06) below. The results indicate that the value of the F-statistic is 0.196486, which is greater than the significance level α = 5%. Therefore, we accept the null hypothesis (H0), indicating that the random error term is characterized by constant variance (homoscedasticity).

Table No. (06): Results of the test for homoscedasticity of the model residuals

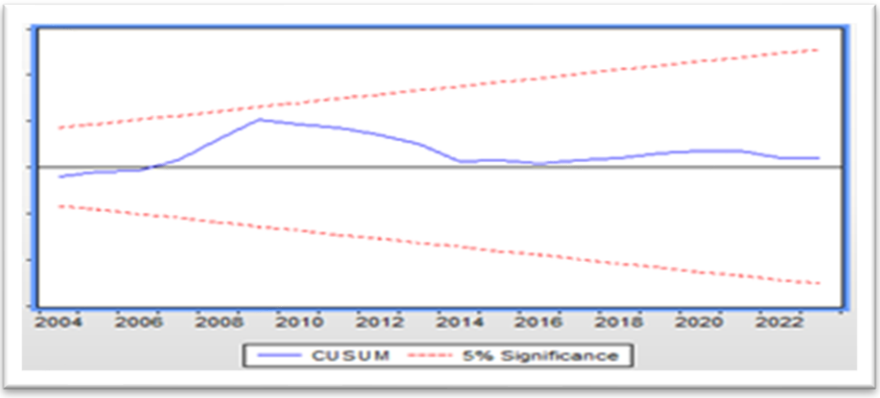
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.974761	Prob. F(15,10)	0.5328
ObsR-squared	15.44009	Prob. Chi-Square(15)	0.4202
Scaled explained	2.193367	Prob. Chi-Square(15)	0.9999

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

- **Test of the stability of the model parameters:**

In order to ensure the validity of the estimated model and the possibility of using it statistically, we conduct a test of the structural stability of the model parameters in both the short and long run, namely the CUSUM test. From Figure No. (01) below, it is evident from the CUSUM curve that the parameters remain stable within the confidence bounds throughout the study period. This indicates and confirms that, over the entire study period, the model is characterized by stability and robustness and is free from structural changes.

Figure No. (01): Results of the test of parameter stability of the model



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

Conclusion:

This study examined the relationship between public financial governance indicators (voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality and its implementation, rule of law, and control of corruption) and the rationalization of public expenditure in Algeria during the period (1996–2023), using an econometric technique represented

by the ARDL model. The study aimed to test the long-run equilibrium relationship between public financial governance indicators and the ratio of public expenditure to gross domestic product. The study reached a set of results summarized as follows:

- After conducting stationarity tests for the study variables using unit root tests, including the Augmented Dickey–Fuller (ADF) test and the Phillips–Perron (PP) test, it was found that the time series of the Regulatory Quality and its Implementation index (RQ) is non-stationary at level, since the value of (prob) is greater than the significance level (5%). After taking the first difference of the time series, the results showed that the value of (prob) becomes less than the significance level (5%), indicating that the series becomes stationary at the integration order I(1). As for the remaining public financial governance indicators (CC, RL, GE, PS, VA), they were stationary at level I(0), since (prob) is less than (5%). The dependent variable, represented by the ratio of public expenditure to gross domestic product (EXP/GDP), was found to be stationary after taking the first difference, that is, at the integration order I(1).
- After conducting the Bounds Test, and based on the F-statistic, the results indicated the existence of a cointegration relationship or a long-run equilibrium relationship between the dependent variable (the ratio of public expenditure to gross domestic product) and the set of independent variables.

  The results of the long-run relationship test of the ARDL model indicate the statistical significance of the following public financial governance indicators: Government Effectiveness (GE) and Voice and Accountability (VA), with positive signs and statistical significance at the 5% level, where (prob = 0.0034) and (prob = 0.0472), respectively. This indicates that, in the long run, the Government Effectiveness index (GE), the Regulatory Quality and its Implementation index (RQ), the Voice and Accountability index (VA), and the Control of Corruption index (CC) positively and effectively affect the ratio of public expenditure to gross domestic product in Algeria. An increase of 1% in these public financial governance indicators leads to an increase in the ratio of public expenditure to gross domestic product in Algeria by 3.4% and 4.72%, respectively, in the long run.

  On the other hand, the Regulatory Quality and its Implementation index (RQ) and the Control of Corruption index (CC) were found to have a negative and statistically significant effect on the ratio of public expenditure to gross domestic product, since the Fisher statistics were respectively (prob = 0.0003) and (prob = 0.0129), which are less than the 5% significance level. Accordingly, an increase of 1% in these two indicators leads to a decrease in the ratio of public expenditure to gross domestic product in Algeria by 0.03% and 1.29%, respectively.

  As for the remaining public financial governance indicators, namely Political Stability and Absence of Violence (PS) and Rule of Law (RL), the results showed that they are not statistically significant at the 5% significance level, with Fisher statistics of 0.5124 and 0.2864, respectively, both of which are greater than the 5% significance level. Thus, political stability and absence of violence, as well as the rule of law index, do not affect the ratio of public expenditure to gross domestic product in the long run.
- With regard to the short-run equilibrium relationship, the results show that the value of the error correction coefficient (CointEq(-1)) is (-1.4020), with a negative sign and statistical significance, as the value of (prob = 0.0009) is less than the 5% significance level. This confirms the existence of a long-run equilibrium relationship among the study variables. The value of the error correction coefficient also indicates that 1.4020% of the deviation of the ratio of public expenditure to gross domestic product (EXP/GDP) in the previous year from its long-run equilibrium value can be corrected during the current period (t) in order to return to the long-run equilibrium position (the

existence of a mechanism for transition from the short run to the long run). This also indicates the existence of an equilibrium relationship among the studied variables in the short run.

- In light of the results reached by this study, the following recommendations are proposed:
- The necessity for the Algerian state to develop and modernize laws and legislation related to finance laws and anti-corruption laws, and to make them more transparent and clearer in order to provide accurate and comprehensive information about its economy and various sectors.
- Strengthening good governance and effective management of financial resources.
- Resorting to the use of technology to improve accounting systems and simplify financial operations.
- Enhancing digital transformation to achieve greater efficiency and reduce opportunities for corruption.
- Strengthening the role of civil society in monitoring public expenditure.
- Strengthening the role of bodies specialized in supervising public funds in order to protect them and combat financial corruption and all forms of waste, squandering, and misuse, to achieve rationalization of public finances, especially in light of the poor rankings obtained by Algeria internationally in terms of combating corruption.
- Benefiting from the models and experiences of developed countries in the field of rationalizing public expenditure.

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Appendices:

Appendix No. (01): Results of estimating the ARDL model

Dependent Variable: EXP_GDP
Method: ARDL
Date: 04/25/25 Time: 00:39
Sample (adjusted): 1998 2023
Included observations: 26 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): VA PS GE RQ RL CC
Fixed regressors: C
Number of models evalulated: 1458
Selected Model: ARDL(2, 0, 0, 2, 2, 2, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
EXP_GDP(-1)	0.122921	0.221242	0.555596	0.5907
EXP_GDP(-2)	-0.524989	0.249528	-2.103924	0.0617
VA	1.025822	0.467501	2.194269	0.0530
PS	0.164659	0.257741	0.638853	0.5373
GE	0.499576	0.259662	1.923950	0.0833
GE(-1)	0.697247	0.301600	2.311825	0.0434
GE(-2)	0.164173	0.175368	0.936167	0.3712
RQ	-1.203489	0.352275	-3.416331	0.0066
RQ(-1)	0.256967	0.245342	1.047384	0.3196
RQ(-2)	0.263341	0.212249	1.240719	0.2430
RL	-0.022929	0.201861	-0.113587	0.9118
RL(-1)	0.284896	0.260099	1.095335	0.2990
RL(-2)	-0.623986	0.315261	-1.979270	0.0760
CC	-0.500365	0.258437	-1.936122	0.0816
CC(-1)	-0.675200	0.301725	-2.237796	0.0492
C	11.19961	7.362538	1.521161	0.1592

R-squared	0.918915	Mean dependent var	35.21463
Adjusted R-squared	0.797287	S.D. dependent var	5.297090
S.E. of regression	2.384942	Akaike info criterion	4.851484
Sum squared resid	56.87948	Schwarz criterion	5.625698
Log likelihood	-47.06930	Hannan-Quinn criter.	5.074430
F-statistic	7.555150	Durbin-Watson stat	2.416701

Appendix No. (02): Results of long- run model estimation using the (ARDL) model

RDL Cointegrating And Long Run Form
ependent Variable: EXP_GDP
elected Model: ARDL(2, 2, 0, 2, 2, 0, 1)
ate: 04/25/25 Time: 17:52
ample: 1996 2023
ncluded observations: 26

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXP_GDP(-1))	0.524989	0.249528	2.103924	0.0617
D(GE)	0.499576	0.259662	1.923950	0.0833
D(GE(-1))	-0.164173	0.175368	-0.936167	0.3712
D(PS)	0.164659	0.257741	0.638853	0.5373
D(RL)	-0.022929	0.201861	-0.113587	0.9118
D(RL(-1))	0.623986	0.315261	1.979270	0.0760
D(RQ)	-1.203489	0.352275	-3.416331	0.0066
D(RQ(-1))	-0.263341	0.212249	-1.240719	0.2430
D(VA)	1.025822	0.467501	2.194269	0.0530
D(CC)	-0.500365	0.258437	-1.936122	0.0816
CointEq(-1)	-1.402067	0.299619	-4.679504	0.0009

Cointeq = EXP_GDP - (0.9707*GE + 0.1174*PS -0.2582*RL -0.4873*RQ + 0.7316*VA -0.8385*CC + 7.9879)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GE	0.970707	0.254086	3.820381	0.0034
PS	0.117440	0.172917	0.679169	0.5124
RL	-0.258204	0.229273	-1.126183	0.2864
RQ	-0.487266	0.088647	-5.496717	0.0003
VA	0.731650	0.323396	2.262392	0.0472
CC	-0.838451	0.277472	-3.021754	0.0129
C	7.987925	5.010653	1.594189	0.1420