Journal of Management and Economic Sciences Prospects | Volume: 10 / N°: 01 (2026), p 533-553

Determinants of Tax Capacity in Algeria: An Econometric Study for the Period 1999-2023

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Received: 07/04/2026 *Accepted: 15/07/2026* *Published:30/07/2026*

Abstract:

This study aims to analyze the determinants of Tax capacity in Algeria during the period from 1999 to 2023, To this end, time-series data for the period 1999 –2023 were used. The study included a set of variables as determinants of Tax capacity, namely: trade openness, as well as value added in agriculture, value added in industry, and per capita GDP,The analysis relied on the Autoregressive Distributed Lag (ARDL) model.

The study's results indicate a statistically significant relationship between the value added of agriculture as a percentage of GDP, the value added of industry as a percentage of GDP, per capita GDP, and tax capacity, which are its determinants in both the long and short terms.

Keywords: Tax capacity; tax revenue; tax burden; ARDL model.

JelClassificationCodes: **H21**, **E62**, **C22**, **H22**.

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1. INTRODUCTION

Tax policy is one of the most important fiscal policy tools employed by the state, in conjunction with monetary and trade policies, to achieve its economic and social objectives, The importance of this policy stems from its ability to determine the optimal tax burden based on actual data and available resources, and thereby contribute to financing its expenditures, Through this policy, the state seeks to balance the need to finance increasing public expenditures on the one hand, and to stimulate economic development on the other, This makes the tax system a mirror reflecting the extent to which government policies are integrated, as expressed through economic policy objectives and the surrounding economic environment that contribute to the achievement of these goals.

Since taxation constitutes a compulsory levy without direct compensation imposed by the state, its success as a tool contributing to the achievement of public objectives remains contingent upon its remaining within certain limits so as not to exceed taxpayers' ability to pay, Uncontrolled expansion of the tax burden is likely to lead to undesirable deflationary effects and, consequently, a reluctance on the part of taxpayers to fulfill their tax obligations, This may negatively impact the state's ability to perform its functions effectively, and it also contributes to dampening productive activity and reducing investment incentives, which ultimately leads to a decline in the state's total revenue, weakens its ability to perform its basic functions toward society, and forces it to resort to alternative revenue sources that may be more costly to meet its necessary expenditures.

In this context tax capacity emerges as a fundamental element of a state's economic planning, as it reflects the tax system's inherent ability to collect resources from various domestic sources without causing structural imbalances or disrupting economic growth and activity, Achieving this capacity means the state has succeeded in striking a delicate balance between the government's need to finance its expenditures, on the one hand, and the ability of citizens and institutions to pay those taxes without

compromising their financial standing or their capacity to continue economic activity, on the other.

In the case of Algeria as a rentier state that relies primarily on oil revenues, it has become imperative for it to shift toward activating the role of general taxation to ensure the sustainability of public financing, given the contribution taxation can make to economic development, Hence the successive tax reforms aimed at strengthening the contribution of non-hydrocarbon sectors to the general budget and making taxation a primary source of funding for the state treasury, so that taxation becomes a financing tool that supports national economic policies rather than a financial burden that hinders the growth and development of economic institutions and various productive activities.

Estimating the size of Algeria's tax base depends on a set of interrelated determinants that must be studied in depth,in order to strive toward achieving an optimal tax burden, starting with the economic structure and the extent to which economic sectors contribute to public revenue, and extending to the social and demographic factors that shape the tax base, To this end, this article seeks to highlight the most important of these determinants and analyze their impact on the efficiency of the Algerian tax system to contribute to the design of a fair tax system that supports economic growth and development.

2. Review of Previous Literature

Recent applied literature agrees that tax capacity is primarily determined by a set of macroeconomic and structural variables, Most studies that have estimated tax capacity or the tax base (internationally or regionally) consider income level or per capita GDP, trade openness, the composition of the production structure (the share of agriculture versus industry and services), and financial or credit development are the most consistent determinants in terms of statistical significance and the direction of the effect on the tax-to-

output ratio (Chigome & Robinson, 2021); (Garg et al., 2017); (Victorova et al., 2020); (Kawadia & Suryawanshi, 2021).

2.1 Per capita GDP and tax capacity

Most studies agree that there is a positive relationship between per capita GDP and tax capacity or tax revenue as a percentage of GDP, with per capita GDP emerging as a key pillar in enhancing tax performance in developing and middle-income countries (Gupta, 2007); (Boukbech et al., 2018), as well as in OECD countries (Castro & Camarillo, OECD , 2014) ,This is explained by the fact that higher income reflects a more modern and formal economy, which leads to a broader tax base and enhances the capacity to bear the tax burden, In a related context, another study conducted on lower-middle-income countries found that per capita GDP is positively associated with tax revenue and is used in the tax capacity and tax effort model (Boukbech et al., 2018), while other studies show that GDP or per capita GDP is positively associated with tax performance in East Africa (Sudan and Rwanda) and Southern Africa (Mmbulaheni et al., 2024); (Bati, 2025), and also appears positively associated with goods and services taxes or income taxes at the regional or developing country level (Ramadhani & Nugroho, 2019); (Kusuma & Wijaya, 2023).

In contrast, some studies in certain economic blocs, such as the BRICS countries, indicate a negative relationship between per capita income and GST revenue, which can be explained by the fact that rising income is associated with a restructuring of revenue sources toward other types of taxes or the expansion of exemption policies for basic goods (Kusuma & Wijaya, 2023) , Furthermore, critical reviews show that some previous studies found a negative effect of per capita GDP on revenue in models dominated by indirect taxes or when the tax progressivity is weak (Kusuma & Wijaya, 2023).

In general it can be argued that this divergence in the direction of the relationship -despite the prevailing consensus on a positive direction-stems from differences in the definition of the dependent variable (total revenue versus a specific type of tax), as well as differences in stages of

development and the structure of the tax system, in addition to differences in the statistical methodology employed (Gupta, 2007); (Boukbech et al., 2018); (Castro & Camarillo, 2014), (Abrar & Hayat, 2025).

2.2 Agriculture's share of gross domestic product and tax capacity

The majority of the literature agrees that a higher share of agriculture in GDP is negatively correlated with tax capacity, due to a combination of factors, the most significant of which is the difficulty of taxing this sector because of its informal nature, as well as the fact that production relies on smallholder farms and subsistence farming, Several studies of developing countries have also shown that agriculture's share of GDP has a significant negative impact on tax revenues, making it a constraint on tax capacity (Gupta, 2007) , Another study conducted on OECD countries also confirmed that the agricultural sector is negatively correlated with total tax revenue (Castro & Camarillo, 2014) , This argument has also been reinforced by comparative studies on the determinants of taxes on goods and services, which suggest that the low tax yield in the agricultural sector is often due to exemptions, small holdings, and the fact that a large portion of production is not officially marketed (Kusuma & Wijaya, 2023).

In contrast, recent studies offer a different perspective, an empirical study conducted in Tanzania revealed that agriculture's share of GDP is positively and significantly associated with as a percentage of GDP, attributing this to the agricultural sector's high contribution to GDP and employment, as well as the effectiveness of policies formalizing the agricultural sector and its associated value chain within the formal system (Awadh et al., 2023) , The literature on tax performance in East Africa also shows that agriculture can be a major driver and contributor to strengthening tax capacity, provided that policies are adopted to integrate agricultural producers into the formal economy and improve value chains and marketing (Bati, 2025); (Awadh et al., 2023).

The variation in agriculture's impact on can be attributed to differences in the degree of formalization of the agricultural sector, its relative size, and the structure of the taxes applied to it, In countries that

grant tax exemptions to agriculture and where the sector is characterized by informality, the impact is negative, whereas the impact becomes positive when the agricultural tax base is broadened or indirect taxes are applied to inputs and outputs of agricultural value chains (Gupta, 2007); (Awadh et al., 2023); (Kusuma & Wijaya, 2023).

2.3 Industry's share of gross domestic product and tax capacity

There is broad consensus in the literature that the share of industry in GDP enhances tax capacity, In an empirical study of OECD countries, the results showed that the value added of the industrial sector as a percentage of GDP has a significant positive impact on tax revenues, This can be attributed to the ease and suitability of industrial activities for taxation in various forms (income, profits, sales, customs) (Castro & Camarillo, 2014) ,This was confirmed by another study in Southeast Asia, which found that the share of industry in GDP is positively correlated with total tax revenue, with manufacturing identified as a key driver for expanding the tax base (Saptono & Mahmud, 2021) , while other studies reinforced this argument, noting that the contribution of industry (alongside other modern sectors) is positively and significantly associated with the efficiency and capacity of personal income tax collection (Ramadhani & Nugroho, 2019).

However, other research has yielded results contrary to the general trend of most studies, a study on Tanzania revealed that, despite its positive impact, the industry's share of GDP lacked statistical significance, attributing this to the small industrial base, weak infrastructure, and legal, administrative, and technological barriers that hinder the growth of the industrial sector, thereby limiting its role in enhancing tax capacity (Awadh et al., 2023) , A recent study of 74 developing countries in 2021 also found that the share of industry in GDP was negatively correlated with tax revenues, particularly in light of the global pandemic, which significantly impacted profits and eroded the tax base of this sector (Abrar & Hayat, 2025) , Nevertheless, the prevailing view remains that, under normal circumstances, the industry is a key driver of growth and through economies of scale, rising profits, and tax traceability (Awadh et al., 2023), (Castro & Camarillo, 2014) , Consequently, the prevailing trend remains

positive, while negative or inconclusive results are attributed to a narrow production base or exposure to exceptional shocks.

2.4 Trade openness and tax capacity

Trade openness plays a central role in models for estimating tax capacity, Numerous empirical studies of developing countries, lower- and middle-income countries, and countries inthat trade openness is positively associated with total and increases tax capacity,This is attributed to the role of international trade in broadening the base of customs and non-customs taxes, stimulating growth, and thereby maximizing the tax base (Gupta, 2007); (Saptono & Mahmud, 2021); (Rahman & Islam, 2023) (Mmbulaheni et al., 2024) , In a study of BRICS countries, it was found that indicators of trade openness and trade freedom contribute to raising the tax-to-GDP ratio and improving tax collection, in parallel with the positive impact of per capita GDP and political stability (Rahman & Islam, 2023 ,On the other hand, a study on South Africa showed that trade openness has a positive and significant impact on performance in both the short and long term (Mmbulaheni et al., 2024) , Other studies in Southeast Asia and South Asia have also supported the positive impact of openness on revenue (Chettri et al., 2023); (Ha et al., 2022); (Saptono & Mahmud, 2021).

In contrast, other studies-at the level of specific countries or regions-indicate an insignificant or mixed effect of trade openness on tax capacity, for example, in a study on Tanzania, it was found that trade volume has a positive effect, though this effect is not statistically significant, reflecting the weakness of the tax structure on trade and its concentration in limited sectors (Awadh et al., 2023) , This was also demonstrated by the results of a study on Sudan and Rwanda, which concluded that trade openness has no significant effect on tax revenues, despite its inclusion in the model, suggesting the presence of other structural determinants such as income, agriculture, political stability, and foreign investment, which remain the most decisive factors in the context under study (Bati, 2025) , Furthermore, comparative studies on Africa and its regions have demonstrated the hypothesis of a nonlinear relationship between openness and growth —and

thus between openness and taxes—and that this relationship can even be negative at times, particularly when imports of consumer goods crowd out productive exports, or if trade gains are not invested in building a taxable productive base (Fatima et al., 2020), (Bunje et al., 2022) .

The reasons for this disparity can be attributed to four key factors: the nature of the trade tax structure, the composition of trade (industrial exports versus consumer imports), the availability and existence of policies to support local manufacturing, and the degree to which the formal economy is integrated into international trade (Rahman & Islam, 2023); (Fatima et al., 2020); (Saptono & Mahmud, 2021) (Bunje et al., 2022) , and evidence suggests that the positive impact was evident in countries where trade liberalization was accompanied by robust tax reform, while the impact remained limited in economies that opened up commercially without deepening their productive base or without building a solid domestic tax system.

To summarize the above, although results vary depending on context and methodology, several common patterns can be drawn from the studies mentioned, namely:

- Most studies across regions (developing countries, middle-income countries, OECD, Southeast Asia, Africa) agree that per capita GDP tends to have a positive impact on tax capacity, with the exception of some models specific to a particular type of tax or to years of crisis (Mmbulaheni et al., 2024) (Bati, 2025); (Gupta, 2007); (Boukbech et al., 2018); (Saptono & Mahmud, 2021); (Castro & Camarillo, 2014); (Kusuma & Wijaya, 2023).

- The literature agrees that agriculture often weakens tax capacity, particularly when it remains informal or exempt, while it can become a positive determinant when targeted by policies aimed at expanding the agricultural tax base and formalizing value chains (Gupta, 2007), (Awadh et al., 2023), (Kusuma & Wijaya, 2023).

- Most studies agree on the positive role and impact of industrialization on tax capacity, through the creation of a structured and easily monitored tax base, although its significance may weaken or be reversed in specific contexts such as economies with a limited industrial

base or periods experiencing severe production shocks (Ramadhani & Nugroho, 2019); (Awadh et al., 2023); (Saptono & Mahmud, 2021); (Castro & Camarillo, 2014); (Abrar & Hayat, 2025).

- Trade openness appears in many models as a positive determinant of revenue and tax capacity, but its direction and strength depend heavily on the structure of the trade tax system and the nature of integration into global trade,Where exports are boosted and the domestic tax system is restructured, the effect is positive and clear; However, when imports of consumer goods predominate without corresponding tax reform, this effect is weakened or becomes insignificant (Rahman & Islam, 2023); Mmbulaheni et al., 2024); Gupta, 2007); (Chettri et al., 2023); (Ha et al., 2022); (Saptono & Mahmud, 2021); (Bunje et al., 2022).

As for the differences among the studies, they are primarily related to:

- Differences in the standard methodologies used: some studies employ dynamic or static panel models to estimate the function, while others use the tax capacity approach or a single-country time-series analysis, leading to differences in the estimation of coefficients and their interpretation (Gupta, 2007); (Boukbech et al., 2018); Saptono & Mahmud, 2021); (Castro & Camarillo, 2014).

- Differences in the definition of the dependent variable, as results vary between studies examining total and those focusing on personal income tax or goods and services taxes, or revenue as a percentage of output versus absolute values (Ramadhani & Nugroho, 2019); (Kusuma & Wijaya, 2023); (Castro & Camarillo, 2014).

- Differences in the time period and context studied, as positive relationships are clearly evident in long, stable periods, whereas periods of crisis (such as the COVID-19 pandemic-The relationship between productive sectors and taxes can temporarily turn negative (Abrar & Hayat, 2025).

- Variations in the level of development and economic structure, where high-income countries with advanced industrial bases tend to show a strong positive impact of industry and openness, while agricultural or mixed

economies reflect a negative or weak impact of agriculture and an inconclusive impact of openness (Bati, 2025); (Gupta, 2007); (Awadh et al., 2023); (Castro & Camarillo, 2014).

3. Description of the Study Model

This study uses annual time-series data for the period from 1999 to 2023 in Algeria, The data were derived from the World Bank database for: per capita gross domestic product (GDP), value added in the agricultural sector as a percentage of GDP, value added in the industrial sector as a percentage of GDP, and trade openness, data were obtained from the National Institute of Statistics, where:

the dependent variable in the model:

TAX: Tax capacity expressed as total to gross domestic product.

The explanatory variables in the model are:

GDP : Per capita GDP (at current US dollar prices).

AGR : Value added in the agricultural sector (% of GDP).

IND : Value added in the industrial sector (% of GDP).

TG : Trade openness expressed as merchandise trade (% of GDP) .

To explore the relationship between the variables, this study specifies the following model:

$$\mathbf{TAX}_t = \beta 0 + \beta_1 \mathbf{AGR}_t + \beta_2 \mathbf{GDP}_t + \beta_3 \mathbf{IND}_t + \beta_4 \mathbf{TG}_t + \varepsilon_t$$

By taking the logarithm of the variables, the model becomes as follows:

$$\mathbf{L\ TAX}_t = \beta 0 + + \beta_1\ \mathbf{LAGR}_t + \beta_2\ \mathbf{LGDP}_t + \beta_3\ \mathbf{LIND}_t + \beta_4\ \mathbf{LTG}_t + \varepsilon_t$$

Where:

L TAX: Logarithm of the Tax capacity.

LGDP: Logarithm of per capita GDP.

LAGR: Logarithm of value added in the agricultural sector.

LIND: Logarithm of value added in the industrial sector.

LTG: Logarithm of Trading Volume.

εt: the random variable.

β_5 ....$_0$ β: Model coefficients.

4. Results of the standard analysis

4.1 Testing the stationarity of time series data

The study relied on the Augmented Dickey-Fuller (ADF) test to test the stationarity of the time series for the period (1999–2023), as a prerequisite for cointegration analysis, where the presence of a unit root was tested at the level and first difference for three cases: (with intercept, with intercept and trend, and without either), with the aim of determining the degree of integration of the variables, in addition to ensuring the absence of second-order (2) integrated variables, The results of this test are shown in the following table.

Table 1. Results of ADF Unit Root Tests

Time series	Statistical t and probability	Level			First difference			Decision
		Only constant	Constant and trend	No constant and trend	Constant only	Constant and trend	Without constant and trend	
LTAX	t-Statistic	-1.9993	-1.9399	0.0197	-5.8661	-6.0456	-6.0083	I(1)
	Prob.	**0.2851**	**0.6030**	**0.6793**	**0.0001**	**0.0003**	**0.0000**	
LTG	t-Statistic	-0.3965	-2.2551	-0.2489	-3.0525	-4.5932	-2.9771	I(1)
	Prob.	**0.8929**	**0.4388**	**0.5859**	**0.0462**	**0.0073**	**0.0049**	
LAGR	t-Statistic	-1.0528	-2.8825	0.1441	-5.7885	-6.0231	-5.8596	I(1)
	Prob.	**0.7169**	**0.1849**	**0.7187**	**0.0001**	**0.0003**	**0.0000**	
LGDP	t-Statistic	-2.2628	-1.4823	1.8156	-3.8516	-4.0937	-3.5435	I(1)
	Prob.	**0.1912**	**0.8074**	**0.9800**	**0.0080**	**0.0196**	**0.0011**	
LIND	t-Statistic	**-1.7877**	-2.5097	-0.3524	-5.6161	-5.5900	-5.6842	I(1)
	Prob.	**0.3772**	**0.3209**	**0.5472**	**0.0001**	**0.0008**	**0.0000**	

Source: Prepared by the researcher based on Eviews 12outputs

The results of the Augmented Dickey-Fuller (ADF) test shown in the table above indicate that all variables under study: LGDP, LIND, LAGR, LTG, and LTAX, are non-stationary at the level, however, when the test is conducted on the first differences, it appears that all series have transitioned to a stationary state, Consequently, we reject the null hypothesis of a unit root and accept the alternative hypothesis (H1), which confirms that all variables are first-order integrated (I(1)).

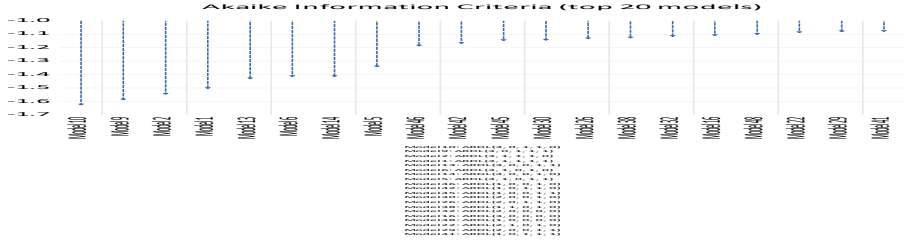
4.2 Estimation of the Study Model

The estimation process begins by determining the optimal lag length as a necessary preliminary step for properly constructing the model, followed by the first stage, which involves applying the Bounds Test to verify the existence of a long-run equilibrium relationship (cointegration) between the study variables, If this relationship is confirmed, the process moves to the second stage, which involves estimating the long-run parameters, leading to the estimation of the error correction model to analyze the dynamics of the response and the short-run adjustment period.

4.3 Determining the optimal lag period for model estimation

To determine the optimal number of lags, we relied on the Akaike criterion, which is the most common criterion based on the lowest statistical value for identifying the appropriate model in the study,The results of the error correction model are illustrated in the following figure:

Fig.1. Determining the optimal lag period for the model



Source: Prepared by the researcher based on Eviews 12outputs

The lag order was determined based on the AIC criterion by selecting the lowest AIC value, and it was found that the ARDL (3.0.1.1.0) model is optimal, the model will be estimated on this basis.

4.4 Cointegration test using the bounds test

The Bounds Test in the ARDL model relies on a statistical comparison of the calculated F-statistic with the critical values of the lower bound I(0) and the upper limit I(1), where the null hypothesis (H0) states the absence of long-run equilibrium, while the alternative hypothesis (H1) asserts its presence, If the calculated value exceeds the upper limit I(1), we reject the null hypothesis and accept the existence of cointegration, however, if it is less than the lower bound I(0), the null hypothesis stating the absence of cointegration is accepted.

The results of this test are shown in the table below.

Table 2. Results of the F-Bounds Test for Cointegration

Model	Calculated F	Decision
LTAX = f(LGDP, LAGR, LIND,LTG)	**7.145880**	**Existence of joint integration**
Critical values	**MinimumI(0)**	**Upper limitI(1)**
Significance level 10 %	2.2	3.09
Significance level 5 %	2.56	3.49
Significance level 2.5%	2.88	3.87
Significance level: 1%	3.29	4.37

Source: Prepared by the researcher based on Eviews 12outputs

The table above shows that the calculated F-value of 7.145880 is greater than the upper critical value of 4.37 at the 1% significance level, and thus the null hypothesis of no cointegration is rejected, and we accept the alternative hypothesis that there is a stable long-run relationship between: tax capacity, value added in the agricultural sector, value added in the industrial sector, trade openness, and per capita GDP, at significance levels of 1%, 5%, and 10%.

4.5 Estimation of Long-Run Parameters for the Model (ARDL)

After confirming the existence of a long-run equilibrium relationship using the boundary test approach, the long-run coefficients of the estimated model should be obtained, as shown in the following table:

Table 3: Results of the estimation of long-run parameters

Variable	Coefficient	Std. Error	t-Statistic	Prob
L AGR	3.337729	1.299037	2.569388	**0.0246**
L IND	4.142220	1.244746	3.327764	**0.0060**
L GDP	-0.760105	0.204737	-3.712586	**0.0030**
L TG	1.629865	1.727645	0.943403	**0.3641**
C	-33.18427	9.334003	-3.555203	**0.0040**

EC = L TAX - (3.3377*L AGR + 4.1422*LIND + 0.7601*LGDP + 1.6299*LTG - 33.1843)

Source: Prepared by the researcher based on Eviews 12outputs

The results in the table above for long-run coefficients show that all variables are significant except for trade openness, meaning that they have a significant long-run effect on tax capacity.

The table above shows a positive relationship between value added in the agricultural sector, value added in the industrial sector, trade openness, and tax capacity:

- A 1% increase in value added in the agricultural sector leads to a 3.337729 % increase in tax capacity, This positive and significant impact of the agricultural sector on in Algeria can be attributed to the stimulating role this sector plays in revitalizing tax channels, as the increase in agricultural value added has contributed to broadening the tax base through complementary links with the manufacturing sector, Modernization measures have also helped integrate a broad segment of investors into the formal system.

- While a 1% increase in value added in the industrial sector leads to a 4.14222% increase in tax capacity, this can be explained by the fact that the industrial sector in Algeria (major public and private enterprises) is the most organized and disciplined in terms of accounting, which reduces opportunities for tax evasion and makes tax assessment and enforcement by the tax administration easy and effective, thereby increasing the tax base for this sector.

- As for per capita GDP, the relationship between the two is inverse: a 1% increase in per capita GDP leads to a 0.760105 % decrease in tax capacity This indicates the existence of a tax gap in the Algerian economy, where the tax administration fails to capture increases in individual incomes and convert them into sovereign revenue, This finding is consistent with numerous studies conducted on rentier states, which indicate that growth in per capita income does not necessarily lead to an increase in tax capacity unless accompanied by deep tax reform that curbs tax evasion in the private and informal sectors.

- As for trade liberalization, it appears to have a positive effect on tax capacity, however, the results obtained showed that this variable is not statistically significant, which can be explained, on the one hand, by the nature of Algeria's foreign trade structure and, on the other hand, by Algeria's adoption of a policy of import subsidies and customs exemptions granted to basic commodities and raw materials, making the relationship between trade openness and tax collection statistically insignificant in the long term.

4.6 Estimation of short-run parameters and the error correction term for the model

Estimating the short-run model parameters represents the relationship between variables in the short run, and we can estimate the short-run relationship here, as shown in the following table:

Table 4: Results of the estimation of short-run parameters and the error correction term

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(L TAX (-1))	0.205760	0.112993	1.821000	**0.0936**
D(L TAX (-2))	0.516630	0.113993	4.532098	**0.0007**
D(LIND)	2.864041	0.416169	6.881927	**0.0000**
D(LGDP)	-2.005652	0.231386	-8.667980	**0.0000**
CointEq(-1)*	-0.513914	0.065941	-7.793586	**0.0000**
R-squared	0.847843	**Meandependent var**		0.009675
Adjusted R-squared	0.812042	**S.D. dependent var**		0.179065
S.E. of regression	0.077632	**Akaike info criterion**		-2.076954
Sumsquaredresid	0.102455	**Schwarz criterion**		-1.828989
Log likelihood	27.84649	**Hannan-Quinn criter.**		-2.018541
Durbin-Watson stat	2.339569			

Source: Prepared by the researcher based on Eviews 12outputs

The estimation of the model reveals the following:

- There is a negative effect of per capita GDP, which is statistically significant and has a negative sign, meaning that an increase in per capita GDP leads to a 2.005652% decrease in , This negative effect reflects the nature of structural imbalances in the economy, where income growth may be accompanied by an expansion of informal activities or tax-exempt sectors, preventing the increase in economic prosperity from translating into a corresponding increase in sovereign revenue, Furthermore, income growth is sometimes linked to the hydrocarbon sector or massive public spending, while ordinary tax collection (linked to individual activity) remains weak.

- As for value added in the industrial sector, it has a positive impact on tax capacity, as an increase in value added in the industrial sector leads to a rise in of 2.864041 %, This can be explained by the fact that the industrial sector is the most organized and structured in the national economy, as industrial enterprises are characterized by a high degree of accounting transparency and ease of tax oversight compared to other sectors, as

confirmed by the high elasticity coefficient (2.86), Consequently, industrial activity represents the true source of regular in Algeria, through its pivotal contribution to corporate income tax (IBS) and value-added tax (TVA) , This growth also reflects the industrial sector's ability to generate formal jobs that ensure a steady flow of gross income tax (IRG).

-It is also noted that the error correction coefficient is statistically significant at the 1% level with a negative sign (-0.513914), which increases the accuracy and validity of the equilibrium relationship in the short term, meaning that the long-term imbalance is corrected at a rate of 51.39 % per year, i.e., it takes approximately 1.94 years to converge toward its equilibrium value following any shock in the model.

- The coefficient of determination is estimated at (0.847843), meaning that 84.7843 % of the changes in the dependent variable are explained by the independent variables, while the remaining percentage is due to other variables not included in the model.

4.7 Diagnostic Tests for the Model

To ensure that the estimated model is free of standard errors, a set of diagnostic tests was conducted, which we review as follows.

4.7.1 Autocorrelation test for errors

To ensure that there is no serial correlation of errors in the estimated model, the Breusch-Godfrey Serial Correlation LM Test , and the results are shown in the table below.

Table 5: Results of the Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.989414	**Prob. F(2,10)**	0.4054

Source: Prepared by the researcher based on Eviews 12outputs

This test is based on the null hypothesis that there is no autocorrelation among the residuals, By testing the LM-Stat and Breusch-Godfrey tests for autocorrelation of errors, as shown in the previous table, it is observed that the probability value is greater than 5%, therefore accepting the null hypothesis and rejecting the alternative hypothesis, consequently, the model is acceptable and does not suffer from an autocorrelation problem in the errors.

4.7.2 Model heteroskedasticity test.

To ensure the absence of autocorrelation in the estimated model, the Breusch-Pagan-Godfrey test was conducted, which assumes the homogeneity of residual variance, The results were as follows:

Table 6: Results of the Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.167031	**Prob. F(9,12)**	0.9942
Obs*R-squared	2.449193	**Prob. Chi-Square(9)**	0.9822
Scaledexplained SS	0.522579	**Prob. Chi-Square(9)**	1.0000

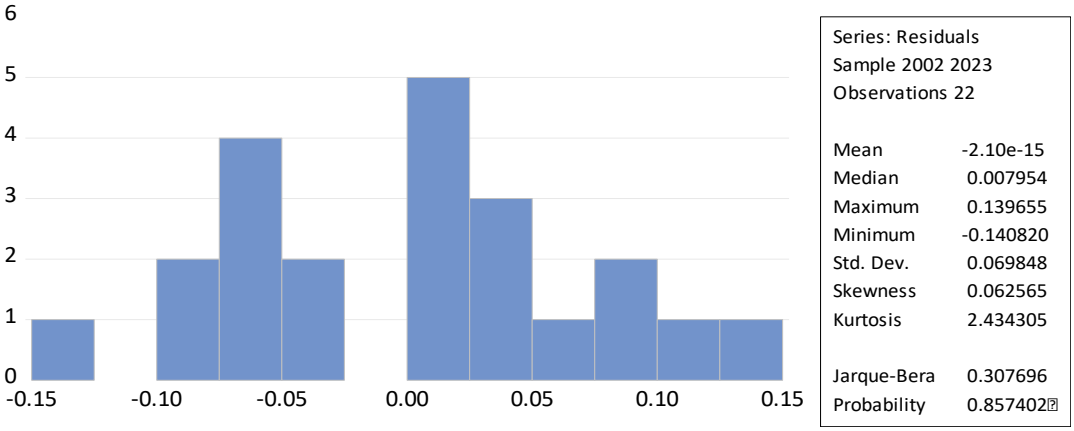
Source: Prepared by the researcher based on Eviews 12outputs.

From the table above, it can be observed that the model is acceptable in terms of the absence of autocorrelation in the errors, as the probability values are greater than the 5% significance level, therefore, the null hypothesis is accepted and the alternative hypothesis is rejected.

4.7.3 Test of the normal distribution of the estimated model residuals.

This test is based on the null hypothesis that the residuals follow a normal distribution, and the results of this test are shown in the figure below.

Figure 2: Results of the normality test



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

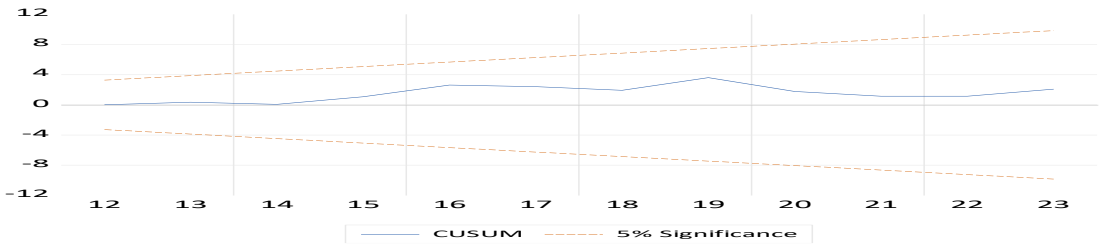
From the figure above, it can be observed that the residuals are normally distributed, since the p-value for the Jarque-Bera statistic, estimated at 0.857402, is greater than the 5% significance level, therefore, the null hypothesis is accepted and the alternative hypothesis is rejected.

4.7.4 Testing the structural stability of the estimated model.

The structural stability test is a crucial step in ensuring the reliability of the estimated parameters in both the short and long term, which is done through two basic tests: Cumulative Sum of Residuals (CUSUM) and Cumulative Sum of Squares of Residuals (CUSUM of Squares) , Structural stability of the coefficients is verified when the test plot lies entirely within

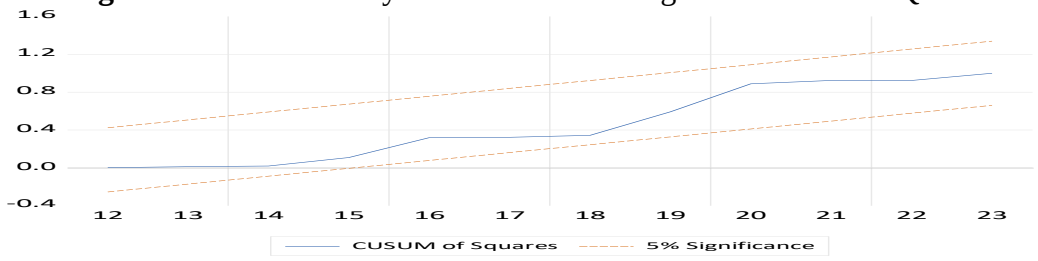
the critical limits at the 5% significance level ,If it falls outside these limits, this indicates parameter instability or a structural change in the model, The test results are shown in the following two figures:

Figure 3: Model stability test results according to the CUSUM test



Source: Prepared by the researcher based on Eviews 12outputs

Figure 4: Model stability test results according to the CUSUMSQ test



Source: Prepared by the researcher based on Eviews 12outputs

From the two figures above, it is clear that the graph lies within the critical boundary lines at the 5% significance level, thus, it can be concluded that there is stability and consistency in the model between the long-term and short-term results.

4. CONCLUSION

In conclusion this study demonstrates that the tax policies adopted by governments are essential tools for ensuring that taxation effectively contributes to the achievement of economic policy objectives, rather than merely a financial burden that hinders development and economic growth, From this perspective, the importance of studying the determinants of tax capacity to achieve optimal tax capacity has emerged, which is considered one of the most significant challenges facing decision-makers in general and in Algeria in particular, This comes as Algeria seeks to reduce its dependence on fossil fuels and revitalize economic sectors that contribute to the economy's value added.

Through the findings of this study, which aimed to identify the determinants of the tax rate in Algeria during the period from 1999 to 2023, we reached the following conclusions:

- The results of the ADF test showed that all variables in the standard model are non-stationary at the zero-order level but stationary at the first-order difference, indicating that they are integrated of order 1.

- There is a statistically significant relationship between the study variables—namely, trade openness (LTG), per capita GDP (LGDP), value added in the agricultural sector (LAGR), value added in the industrial sector (LIND), and tax capacity (LTAX) in the long run.

- There is a positive direct relationship between value added in the agricultural sector (LAGR) and tax capacity (LTAX) in Algeria in the long run, This is consistent with the positive impact of agriculture on tax capacity, as confirmed by several studies (Gupta, 2007); (Awadh et al., 2023); Kusuma & Wijaya, 2023) , As for value added in the industrial sector (LIND) , the statistically significant positive coefficient indicates that it is a determinant of (LTAX) in Algeria in the long run, while the effect of trade openness (LTG) was positive but not statistically significant.

-As for trade openness, it appears to have a positive effect on tax capacity, which is consistent with much of the literature and studies confirming the positive impact of trade openness on tax capacity, however, the results obtained showed that this variable was not statistically significant (Bati, 2025); (Awadh et al., 2023) , This can be explained, on the one hand, by the nature of Algeria's foreign trade structure and, on the other hand, by Algeria's adoption of a policy of import subsidies and customs exemptions granted to basic commodities and raw materials, which rendered the relationship between trade openness and statistically insignificant in the long term.

- There is a statistically significant relationship between the aforementioned variables in the short term, meaning they have an impact on in Algeria.

- There is a negative effect of per capita GDP (LGDP) in the short

term, as it is statistically significant and has a negative sign, meaning that an increase in per capita GDP (LGDP) leads to a 2.005652% decrease in tax capacity (LTAX), which is consistent with some studies that have confirmed the negative impact of income, particularly in rentier states (Al-Zawagi, 2017), (Bash and Al-Maamouri, 2005), (Castro & Camarillo, 2014), in which the per capita share of gross domestic product (LGDP) is shown to have a negative effect on tax capacity, As for value added in the industrial sector (LIND) , it has a positive effect on tax capacity (LTAX), as an increase in value added in the industrial sector (LIND) leads to a rise in tax capacity (LTAX) by 2.864041%, which is consistent with most previous studies that have confirmed the positive impact of manufacturing on tax capacity (Castro & Camarillo, 2014).

- The results show that the error correction coefficient is statistically significant at the 1% level and has a negative sign (–0.513914), which increases the accuracy and validity of the equilibrium relationship in the short term and implies that the long-term imbalance is corrected at a rate of 51.93% per year, meaning it takes approximately 1.92 years to converge toward its equilibrium value following any shock in the model.

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