

The Impact of Fiscal Policy on Inclusive Growth in Algeria: 1990–2023

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Abstract:

The aim of this study is to measure the impact of fiscal policy on inclusive growth in Algeria during the period 1990–2023. The literature related to the topic was reviewed, and the evolution of the study variables was analyzed. In addition, the ARDL model was employed to estimate the relationship between fiscal policy instruments and per capita national income in US dollars, used as a proxy for inclusive growth.

The results showed a weak but significant positive effect of public expenditures, whereby a 1% increase in public expenditures leads to a 0.072% increase in per capita national income in the short run and a 0.46% increase in the long run. This is attributed to the crowding-out effect in the Algerian economy. Additionally, the findings revealed a negative impact of public revenues in the long run only, where a 1% increase results in a 0.346% decrease in per capita national income.

Key Words: *Fiscal policy; Public Expenditures; Public Revenues; Inclusive Growth; Per Capita National income*

JEL Classification: *H50; H20; E01; O40; I32*

1. Introduction

Poverty is considered one of the greatest challenges and dilemmas facing governments around the world. All economies whether developed or developing seek to adopt various mechanisms to reduce this phenomenon and improve individuals' real income levels, especially in the context of rapid and continuous demographic growth and record-high inflation rates. These efforts, however, are constrained by the scarcity of essential economic resources, which poses a significant obstacle to the effectiveness of economic policies aimed at poverty reduction.

Poverty reflects the social standard of citizens in society. (Zerrouki & Laib, 2022, p. 831) According to the World Bank, poverty is characterized by malnutrition, illiteracy, and disease, whereby an individual's income falls below a level considered adequate for a decent standard of living. Poor individuals are thus more deprived than others and represent the segment of the population that does not receive a minimally acceptable level of economic and social well-being. However, the concept of poverty has since broadened and become increasingly linked to the notion of development. The international community has agreed that, in addition to low income, poverty also encompasses deprivation of essential and interrelated life needs, such as access to healthcare, education, and an adequate standard of living. (Boukssani & Allam, 2014) And all the basic requirements that lead to the achievement of human development (Ait Laziz & Fatoum, 2023, p. 298)

Fiscal policy plays a critical role in influencing aggregate demand, whether by stimulating or curbing it. This, in turn, The orientation of fiscal policy, whether expansionary or contractionary, is determined by prevailing economic conditions. In times of recession or when aggregate demand falls short of aggregate supply, governments tend to adopt an expansionary fiscal policy, characterized by increased public spending or reduced taxation, in order to stimulate demand and boost economic growth. Conversely, when inflationary pressures emerge due to aggregate demand exceeding aggregate supply, a contractionary fiscal policy is pursued by reducing public expenditure or increasing tax rates, with the aim of containing inflation and restoring economic balance. (Denden & Gueddal, 2021, pp. 559-560)

An increase in public expenditure such as spending on households and public projects contributes to raising both the real and nominal incomes of individuals. This can occur through lower prices or through direct monetary transfers in the form of wages or support for micro-enterprises, thereby enhancing individuals' purchasing power and ultimately alleviating poverty. In addition, fiscal policy can be employed through tax measures, such as reducing taxes on individuals and businesses, which increases disposable income and stimulates consumption.

Accordingly, the Algerian state has allocated substantial financial resources to implement public finance policies. During the period 1990–2023, public expenditure amounted to over 134 trillion Algerian dinars, representing approximately 34% of the gross domestic product (GDP). Public revenues were estimated at around 105 trillion Algerian dinars, or roughly 26% of GDP, according to World Bank data. This resulted in a cumulative budget deficit of nearly 29 trillion Algerian dinars over the same period.

1.1 The problem of the study:

Although numerous studies have addressed the impact of fiscal policy on economic growth in Algeria, they have not sufficiently emphasized the dynamic effects of fiscal policy instruments on inclusive growth. Using GDP as a conventional growth indicator fails to adequately capture

how fiscal policy variables interact with household income levels over time. Moreover, GDP, as a classical proxy for growth, does not necessarily reflect inclusive growth, as it is highly sensitive to oil price fluctuations and inflationary pressures. Such a traditional approach obscures critical dimensions related to the capacity of growth to alleviate poverty and improve living standards. Within this framework, per capita national income measured in US dollars is adopted as an alternative indicator of inclusive growth, as it directly reflects the effects of fiscal policy on the income levels of Algerian households, independent of the country's heavy reliance on hydrocarbons. This choice provides a more refined classification of the role of fiscal policy instruments in enhancing welfare in both the short and long run, while mitigating distortions arising from exchange rate volatility of the Algerian dinar and the structural dependence on oil revenues.

Accordingly, the central research question guiding this study is formulated as follows:

What are the dynamic effects of fiscal policy instruments (public expenditure and public revenues) on inclusive growth in Algeria over the period 1990–2023, as reflected through their impact on per capita national income in US dollars?

1.2 Specific Research Questions:

Building on the central research problem, the study seeks to address the following sub-questions:

- What are the short- and long-run effects of public expenditure and public revenues on per capita national income (measured in US dollars) in Algeria?
- How do the effects of fiscal policy instruments on inclusive growth differ between the short run and the long run?

1.3 Study hypotheses:

Based on the stated problem, the study puts forward the following hypotheses:

- **Hypothesis 1:** Public expenditure and public revenues have a statistically significant effect on per capita national income (measured in US dollars) in Algeria in the short run.
- **Hypothesis 2:** There exists a long-run relationship between fiscal policy instruments (public expenditure and public revenues) and inclusive growth in Algeria.
- **Hypothesis 3:** The nature and magnitude of the effects of fiscal policy instruments on inclusive growth differ between the short run and the long run.

1.4 Objectives of the study:

This study aims to examine the role of public finance tools namely public expenditure and public revenues in improving individual income levels and reducing the poverty rate in Algeria.

1.5 Importance of the study:

The importance of this study lies in identifying the tools and effectiveness of fiscal policy in alleviating poverty—one of the most pressing challenges facing governments worldwide. Addressing poverty is considered a fundamental duty and social responsibility of governments toward their citizens.

1.6 Study Methodology:

To address the research problem, the study adopts a descriptive-analytical approach, reviewing the key concepts of the variables under investigation (public expenditure, public revenues, and per capita national income in USD), as well as the relevant literature. In addition, the study employs a quantitative approach by modeling the relationship between the variables using the Autoregressive Distributed Lag (ARDL) methodology.

1.7 Division of the study:

The study is divided into three main sections:

- **Section One** provides a literature review, analyzing previous studies related to the research topic.
- **Section Two** focuses on modeling the relationship between public expenditure and revenues and per capita national income in USD using the ARDL approach, with the aim of testing the dynamic linkages among the variables.
- **Section Three** is dedicated to analyzing the empirical results and presenting a set of recommendations based on the findings.

2. Literature Review and Theoretical Framework:

2.1 Literature Review:

The topics of inclusive growth and fiscal policy have attracted considerable attention from many economists and researchers, given the importance of addressing poverty at both the economic and social levels. Econometric studies have played a significant role in examining this issue, with some of the most notable studies being the following:

The study by (Marwa, 2023) aimed to analyze the impact of fiscal policy, represented by both government spending and tax revenues, as well as monetary policy, represented by the broad money supply, on inclusive growth in Egypt during the period from 1990 to 2022. The ARDL model was employed to measure these relationships.

The results revealed that fiscal policy, represented by both total government spending and spending directed towards the health and education sectors, had a positive effect on inclusive growth in the long run. However, this effect was found to become negative in the short run. As for tax revenues, they showed a negative impact on inclusive growth in both the short and long run. Regarding monetary policy, the study found that the money supply had a negative effect on inclusive growth in both periods as well.

(Dalkitsi, 2024) research looked at the complicated link between income derived from customs tariffs and GDP growth. This study aspires to illuminate the complex nature of this connection by means of the study of theoretical frameworks and the analysis of empirical data from several backgrounds. A close examination of the current research shows the immediate and indirect routes by which customs duty income impacts economic development.

The research stresses the complicated impacts of custom duty income on important economic indicators including GDP growth, by combining results from many sources. And The study also examines the obstacles and possible compromises involved in depending on custom duties for government revenue. Particularly in the context of globalization and the evolving trade patterns, it stresses how crucial it is to strike a balance between income production and inclusive economic growth promotion.

The study by (Yasser , 2023) explored the role of fiscal policy as an economic tool that contributes to economic development and addresses macroeconomic stability challenges, with a focus on Egypt as a developing country facing constraints such as limited resources, currency depreciation, and rapid population growth. The study highlighted that Egypt's expansion in utilizing fiscal policy tools—whether through public spending or tax revenues—aims to achieve economic policy objectives and finance development. However, the increasing size of public expenditures reflects the complexities of government intervention in economic activities.

The study adopted the Multiple Linear Regression (LSM) methodology to analyze the impact of tax revenues—specifically income taxes and customs duties—on Egypt’s Gross Domestic Product (GDP) over the period 2000–2020. This analysis was conducted using reliable official data, despite the structural challenges facing the Egyptian economy.

The results demonstrate a positive association between most components of tax revenue—including income tax, sales tax, and customs duties—and economic growth. However, “other taxes” showed a negative relationship in certain years, which is attributed to their relatively limited contribution, despite the overall increase in total tax revenues during those periods.

The study recommends the adoption of three main policy measures: first, the development of effective collection mechanisms for non-traditional “other taxes” in order to diversify revenue sources; second, the acceleration of the digital transformation of the tax system to enhance efficiency and reduce tax evasion; and third, the restructuring of the tax system by strengthening the value-added tax (VAT) at the expense of the sales tax, with the aim of improving long-term economic performance.

The research of (Daas & meradci, 2020) seeks to investigate how the state utilizes the instruments of fiscal policy, particularly public expenditure and revenues, to produce the intended effects on the economy whether through adopting an expansionary or contractionary fiscal policy depending on the prevailing economic conditions, such as inflation or recession. Descriptive statistical techniques were used to examine the behavior of specific economic indicators dependent on official statistics provided by national and international organizations in order to fulfill the aim of the study. According to the study, during the period, (2010–2014) Algeria pursued an expansionary fiscal policy, while during the years (2015–2019), a contractionary fiscal policy was pursued, therefore negatively impacting several economic indicators including GDP growth.

The researchers (Boussiki & Larem, 2019) focused on examining the impact of fiscal and monetary policies on GDP in Algeria From the first quarter of 1990 until the fourth quarter of 2018, using the Error Correction Model (ECM).

The study also examined the interaction between monetary and fiscal policies and their influence on economic activity. In this context, the money supply was used as a proxy for monetary policy, while public spending represented fiscal policy. Economic growth was measured through GDP. The authors found that a sudden disruption in the money supply generates a persistent positive effect on GDP. Similarly, a shock in public spending also had a positive effect, albeit to a lesser extent. This suggests the limited effectiveness of expansionary fiscal policy or the delayed impact of public investment projects, particularly in infrastructure. The results further showed the absence of a direct effect of government expenditure on GDP during the study period.

Based on these findings, the authors recommend restructuring public spending and redirecting it towards high value-added productive sectors that enhance economic efficiency. They also stress the need to reduce reliance on external sources of financing, which may lead to economic imbalances due to their volatility, and instead focus on mobilizing domestic resources. Additionally, the study highlights the importance of adopting more efficient fiscal policies in utilizing available resources, setting clear development priorities, and diversifying income sources.

The study by (Yakova, 2018) aimed to analyze the tax system in Bulgaria, focusing on the relationship between consumption taxes and economic growth. The study examined the components of tax revenues and their impact on macroeconomic indicators, with particular attention to public expenditure and its connection to per capita GDP. A linear regression model using the Least Squares Method (LSM) was employed for the empirical analysis, allowing the examination of the state's redistributive function through the perspective of the tax burden.

The results revealed that value-added tax (VAT) and income tax are the main sources of tax revenues within the categories of indirect and direct taxes, respectively. Furthermore, improvements in these revenues were found to be associated with a potential increase in government spending.

The results also revealed that economic growth leads to a decrease in income tax revenues, while contributing to an increase in VAT and customs duties revenues. This reflects the nature of the Bulgarian tax system, which heavily relies on consumption taxes. This relationship suggests that the expansion of economic activity supports indirect tax revenues, thereby enhancing the state's ability to finance public expenditure and achieve its redistributive goals within a tax structure that focuses on consumption as a primary source of revenue.

In the context of analyzing fiscal policy (Zebiri & Aouag, 2018) discussed the role of fiscal policy as a tool for influencing growth and employment, that is, increasing output and creating job opportunities, while aiming to achieve economic and social progress. The success of fiscal policy in Algeria is linked to the government's ability to allocate public budget revenues, including tax revenues and oil revenues, to cover both investment and current public expenditure, in order to achieve economic and social development. Since independence, the Algerian economy has undergone numerous changes in concepts, ideologies, and strategies. Additionally, fluctuations in oil prices, which are the primary financial resource for the Algerian economy, have had a significant impact on public finance, where oil taxation constitutes its main revenue source, thereby affecting the performance of fiscal policy and its role in achieving economic balance.

Through a review of the literature, it was observed that most studies have focused on the impact of fiscal policy on economic growth, measured through Gross Domestic Product (GDP). However, GDP does not accurately represent improvements in individuals' real incomes or reductions in poverty levels, as it does not account for inflationary pressures in the overall price level or the demographic growth present in society. Previous studies have primarily highlighted the impact of public finance on government expenditure but overlooked the importance of revenue policies, which are also crucial for economic activity.

Some studies have confirmed a positive impact of public expenditure on economic growth, aligning with economic theory. To address the gaps identified in the literature, this study will explore the effect of both public expenditure and revenue as independent variables representing fiscal tools, on per capita national income (in US dollars) as the dependent variable. This variable reflects the annual income level of individuals in dollars and provides an improved poverty index for the community. The latter variable was chosen because it considers demographic growth, inflation, and fluctuations in the overall price level within the Algerian economy.

2.2 Theoretical Framework:

Inclusive growth refers to a holistic approach to analyzing the relationship between economic growth, poverty, and inequality by integrating these three dimensions and assessing their mutual interactions in achieving growth inclusiveness. This conceptual framework emphasizes that fostering inclusive growth requires a comprehensive set of economic and social policies, including pre-distribution measures such as improving access to education and healthcare, enhancing the effectiveness of inclusive institutions, and reforming labor markets and infrastructure, as well as redistribution policies that broaden the tax base and channel public investment toward productive sectors. Moreover, fiscal policies play a vital role in promoting financial inclusion and improving access to banking services, while agricultural policies contribute to raising productivity and phasing out inefficient subsidies. Altogether, this framework provides a practical tool for guiding public policies aimed at reducing poverty, narrowing inequality, and achieving sustainable and inclusive economic growth. (Kireyev & Chen, 2017, p. 23)

Fiscal policy instruments play a pivotal role in promoting inclusive growth, either by directing government expenditure toward improving individuals' social indicators—such as education and health—or by reducing unemployment and poverty through supporting productive sectors and employment programs. Moreover, fiscal policy contributes to achieving a more equitable distribution of income across different social groups by providing social services at low cost or free of charge in some cases, in addition to alleviating tax burdens or granting exemptions for low-income households.

In this context, attention has increasingly turned toward the study of endogenous growth theories, which seek to explain the role of fiscal policy in stimulating the accumulation of physical and human capital and, consequently, in achieving sustainable economic growth. These models represent a qualitative shift in economic thought, as they focus on the internal drivers of growth—such as investment in education and research and development—rather than relying solely on external factors, as emphasized in traditional growth models.

Among the most prominent models is that of Barro (1990), which demonstrated that public expenditure exerts a dual effect on economic growth. On the one hand, public spending can stimulate growth through productive expenditure that promotes the accumulation of physical and human capital—such as government investments in infrastructure, education, and health—thereby enhancing productivity. On the other hand, public expenditure may slow down economic growth when it is directed toward non-productive consumption spending, as this tends to increase inflationary pressures and weaken incentives for saving and investment. (Barro, 1990, pp. S103-S107)

Barro (1990) also showed that the impact of fiscal policy on economic growth can be long-term, contrary to traditional growth models which consider such effects temporary. He explained this by arguing that productive government expenditure leads to a sustained accumulation of physical and human capital. Moreover, he noted that the relationship between fiscal policy and economic growth is nonlinear, in the sense that increasing public spending fosters growth up to a certain threshold, beyond which the costs of additional expenditure outweigh its benefits, leading to a decline in economic efficiency. The model thus concludes that the ultimate effect of government spending on growth depends not on its total size but on its composition—that is, the extent to

which spending is allocated toward productive investment that enhances efficiency, rather than consumption-oriented expenditures that hinder economic growth. This finding highlights that the evaluation of fiscal policy should take into account the structure of public expenditure and its returns in terms of capital accumulation and productivity. (Barro, 1990, pp. S103-S107)

In the same context, Romer's (1986) endogenous growth theory followed a similar approach to that proposed by Barro, particularly regarding the role of fiscal policy in stimulating the accumulation of human capital through public spending on education and health. Romer considered fiscal policy to be a central instrument for achieving inclusive economic growth, as growth in his model does not depend solely on the accumulation of physical capital, as in traditional models, but rather on knowledge generation and the expansion of human capital as production inputs characterized by increasing returns. (Romer, 1986, pp. 1004-1012)

The importance of fiscal policy in this model is manifested through the allocation of public expenditure toward education, research and development, and infrastructure, as such spending enhances knowledge accumulation and creates positive externalities that foster innovation and expand the production base. Moreover, when effectively designed, incentive-based tax policies can encourage investment in high value-added sectors, thereby generating more sustainable and inclusive growth. Hence, under Romer's framework, fiscal policy contributes not only to increasing GDP but also to achieving inclusive growth by expanding employment opportunities, improving labor productivity, and reducing social disparities through human capacity development and a fairer distribution of the benefits of growth. (Romer, 1986, pp. 1004-1012)

With the evolution of the concept of inclusive growth, modern models have emerged to explain the relationship between fiscal policy and inclusive growth, among which the model proposed by Kireyev and Chen (2017) is one of the most prominent. This model indicates that achieving inclusive growth requires fiscal policy to focus on three key components: sustainable economic growth, poverty reduction, and social equity. To achieve this, a pro-growth fiscal policy should include effective investment in productive sectors, tax policies that stimulate economic activity, structural reforms aimed at strengthening the role of the private sector, coordination with monetary policy, and social expenditures directed toward improving access to education, healthcare, and accelerating infrastructure reforms. Moreover, fiscal policies designed to reduce poverty and achieve a fairer distribution of wealth should accompany these measures by mitigating the adverse effects of growth on income distribution while preserving its positive impact through lowering progressive direct taxes, moderately increasing indirect taxes to broaden the tax base, and promoting productive public investment. Accordingly, the Kireyev and Chen (2017) model affirms that the effectiveness of fiscal policy in achieving inclusive growth depends on its ability to strike a balance between economic growth, social equity, and poverty reduction. Kireyev & Chen, 2017, pp. 24-25)

The inclusive growth model developed by the Organisation for Economic Co-operation and Development (OECD, 2015) posits that the assessment of economic performance should not be confined to the rate of GDP growth, but should instead encompass a multidimensional standard of living that combines income and its redistribution, health, and employment opportunities. The OECD emphasizes that economic growth cannot be considered inclusive unless its benefits are shared across all social groups, particularly low-income households. Within this framework, fiscal policy emerges as a key instrument for achieving inclusive growth by directing public

spending toward education, healthcare, social protection, and employment promotion, thereby enhancing income levels and reducing disparities in well-being. Furthermore, the framework underscores that maintaining a balance among the three dimensions of inclusive growth— income, employment opportunities, and health—is essential for ensuring the inclusiveness of growth, as income gains alone are insufficient without corresponding improvements in health service quality and the expansion of job opportunities. (Boarini, Murtin, & Schreyer, 2015, pp. 3-14)

Based on the foregoing, it becomes evident that fiscal policy, when effectively designed, is not merely a tool for achieving macroeconomic stability, but rather a means of fostering inclusive growth through investment in knowledge and human capital, enhancing productivity, expanding employment opportunities, and reducing social and economic disparities.

3. An econometric study of the impact of public fiscal policy instruments on individuals' income levels in Algeria during the period 1990–2023:

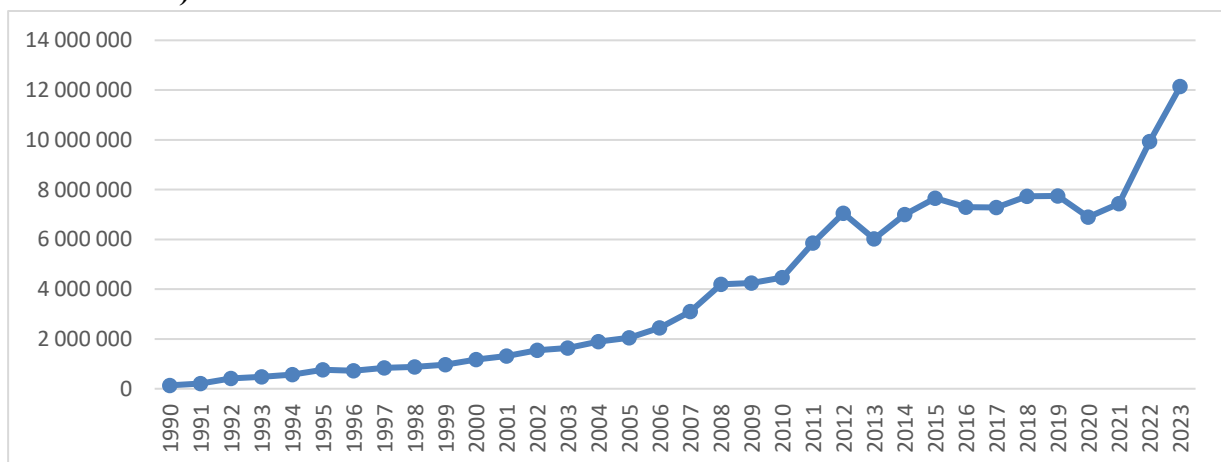
3.1 Analysis of the trends of the study variables:

3.1.1 Analysis of public expenditures:

We can observe from Figure 1 that there was an increase in public expenditures during the period 1990-2012, rising from 136,500 million DZD to 7,058,173 million DZD, with an average of 2,042,883 million DZD. The annual average growth rate of public expenditures during this period was 21.2%. As for the period 2013-2023, public expenditures experienced continuous fluctuations, with an average of 7,922,400 million DZD and a growth rate of 5.9%. This was due to a decline in public expenditures in the years 2013, 2016, 2017, and 2020.

In general, the annual average of public expenditures during the study period was 3,945,080 million DZD, with the lowest value being 136,500 million DZD and the highest value occurring in 2023 at 12,142,015 million DZD.

Fig.1. Evolution of public expenditures in Algeria during the period 1990-2023 (unit: million DZD)



Source: Prepared by researchers and based on World Bank data

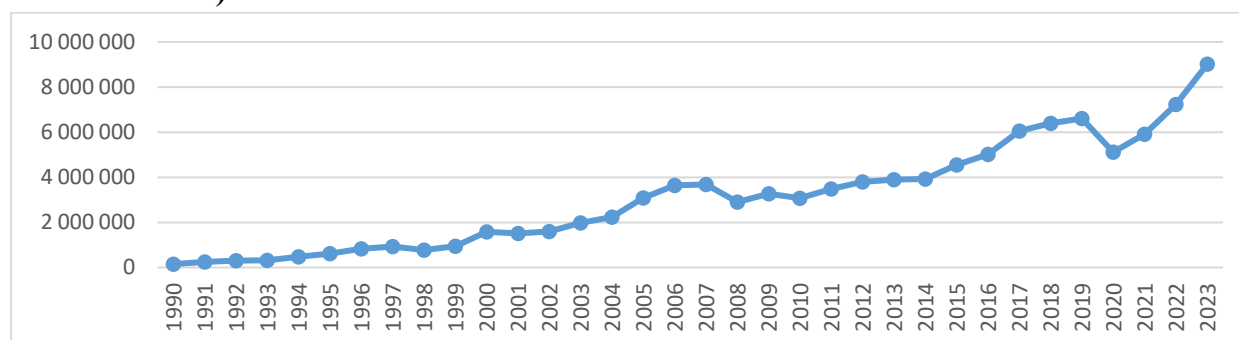
2.1.3 Analysis of public revenues:

From Figure 2, we can observe that public revenues experienced continuous growth during most periods of the study. During the period 1990-1997, public revenues increased from 152,500 million DZD to 926,668 million DZD, with an annual average of 483,494 million DZD. Public revenues improved between 2002 and 2007, with an annual average growth rate of 16.7%. In

the period 2011-2019, public revenues rose from 3,489,810 million DZD to 6,601,576 million DZD.

The lowest value of public revenues occurred in 1990 at 152,500 million DZD, while the highest value occurred in 2023 at 9,014,442 million DZD. The annual average of public revenues during the study period was 3,092,341 million DZD, with an average annual growth rate of 14.9%.

Fig.2. Evolution of public revenues in Algeria during the period 1990-2023 (unit: million dinars)



Source: Prepared by researchers and based on World Bank data

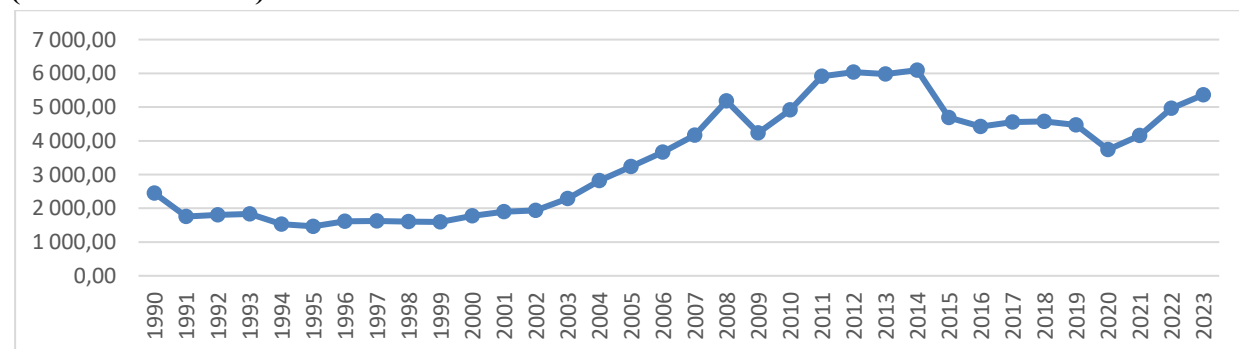
3.1.3 Analysis of per capita national income:

From Figure 3, we can observe that the level of individuals' income showed significant fluctuations during most periods of the study. The per capita share of national income ranged between 1,466 and 2,445 USD during the period 1990-1999. However, between the years 2000 and 2008, there was a continuous improvement in the per capita share of national income, rising from 1,772 USD to 5,180 USD per year. This was due to the improvement in oil prices, which increased from 28 to 97 USD per barrel during that period.

The period 2009-2023 also witnessed fluctuations in the per capita share of national income, with the highest value recorded in 2014 at 6,094 USD per year. The lowest value occurred in 2020 at 3,743 USD due to the impact of the COVID-19 pandemic, which led to a decline in global economic activity and the suspension of various sectors' production.

Due to the fluctuations in annual income levels, the per capita share of national income did not show significant improvement, with the average annual per capita income during the study period being 3,480 USD. The average annual growth rate of the per capita share of national income was only 3%.

Fig.3. Annual per capita national income in Algeria during the period 1990-2023 (unit: US dollars)



Source: Prepared by researchers and based on World Bank data

3.2 Formulation of the form:

ased on previous studies, the analysis of the evolution of the study variables, their trends, and the factors influencing them, along with the availability of data, the inflation rate has been adopted as the dependent variable. Meanwhile, the money supply and the nominal exchange rate have been included as independent variables in the model.

An annual time series covering the period from 1990 to 2023 (with a total of 34 observations) has been used, derived from the World Bank data for Algeria.

The equation will be transformed into the natural logarithm (ln) to make the model linear, similar to economic growth functions, in order to analyze the relative impacts between the variables using elasticities, as well as to achieve homogeneity in the units and measurements between the variables.

$$LNRIBCA = a + \beta_1 LNDEPENC + \beta_2 LNRECETTE + \beta_3 LNPRIXPET + \varepsilon$$

Where:

- **LNRIBCA**: the natural logarithm of Per capita national income (in US dollars).
- **LNDEPENC**: the natural logarithm of total public expenditures.
- **LNRECETTE**: the natural logarithm of total public revenues.
- **LNPRIXPET**: the natural logarithm of the price of oil per barrel.
- **a**: represents the constant term.
- **$\beta_1, \beta_2, \beta_3$** : represent the elasticities.
- **ε** : represents the random term.

3.3 Testing the Stationarity:

From the results of the Appendix .1, we can observe that the p-values (Prob.) for all variables at the level were greater than 0.1 in all cases, except for the **LNEXPENSE** variable, which was less than 0.05 with the presence of a constant and a general trend. This indicates the presence of a unit root and the non-stationarity of the variables at the level. However, when considering the first difference, the p-values decrease to less than 0.05, which indicates the rejection of the unit root hypothesis at the first difference. This allows us to use the ARDL (Autoregressive Distributed Lag) methodology.

3.4 Optimal Lag Length:

The delay degree of the model path is primarily determined based on the Akaike Information Criterion (AIC), where the model that achieves the lowest value for this criterion is selected. This is considered an indicator of the optimal delay degree from a statistical perspective. Referring to the information shown in the Appendix.2, we observe that the best model corresponds to the degree that yields the lowest AIC value, indicating that the optimal lag order for the variables is the (2, 3, 2, 4) ARDL model.

According to the results of the ARDL model estimation, the R-squared value reached approximately 0.859, This indicates that about 86% of the dynamics of per capita income are explained within the mode.

Moreover, the F-statistic was about 6.551900, with an associated p-value of 0.000421, which signifies the overall significance of the model. Therefore, the model has good quality of estimation and possesses strong statistical significance.

3.5 ARDL Bounds Test:

Appendix.3 shows that the F-statistic value reached 6.893711, which exceeds all the upper critical bounds at the 10%, 5%, and 1% significance levels.

This provides statistical evidence of a long-run equilibrium relationship within the model, supporting the transition to estimating the long-run dynamics within the ARDL framework.

3.6 Estimation of the long-term relationship:

Appendix.4 indicates that all p-values for the model's parameters are significant, which reinforces the strength of the relationship between the independent variables and the dependent variable

3.7 The Error Correction Model (ECM):

Appendix.5 shows that the error correction term $CointEq(-1)$ is estimated at -0.762202, which is negative and statistically significant at the 1% level (P-value = 0.0000). This indicates that approximately 76.22% of the deviations from the long-run equilibrium, caused by short-run shocks, are corrected within one period (one year). This provides strong evidence of the model's ability to return to long-run equilibrium at a relatively fast pace, suggesting that the cointegration relationship and long-run equilibrium are genuine and not spurious.

Moreover, the results in the same table reveal a statistically significant short-run relationship between the independent variables and the dependent variable.

3.8 Diagnostic Tests:

After estimating the model, it is essential to assess its quality by conducting the following diagnostic tests:

Appendices 6, 7, and 8 indicate that all p-values of the diagnostic tests (Jarque-Bera Test, ARCH Test) are greater than the significance levels of 5% and 10%. Accordingly, it is concluded that the residuals follow a normal distribution, there is no autocorrelation, and the variance is homoscedastic. Therefore, the model is free from econometric problems

3.9. Structural Stability Test of the Model :

From the Appendix.9, we observe that the plot curves for both tests (CUSUM and CUSUMSQ) lie within the 95% confidence interval bounds, indicating that the model exhibits structural stability.

4. CONCLUSION

The study identified the role of fiscal policy in achieving inclusive growth in Algeria by employing the ARDL model during the period 1990–2023. After verifying the model's validity and confirming the existence of a cointegration relationship among all the study variables, the following results were obtained:

Short-term: There is a positive (direct) and statistically significant relationship between Per capita national income, the previous value of Per capita national income, public expenditures, and oil prices. However, public revenues had no significant impact on Per capita national income, as follows:

- A 1% increase in the previous values of Per capita national income leads to a 0.45% improvement in current Per capita national income.
- A 1% increase in public expenditures leads to a 0.072% increase in Per capita national income.
- A 1% increase in oil prices leads to a 0.32% increase in Per capita national income.

Long-term: The estimation results indicate a long-term positive equilibrium relationship, statistically significant at the 2.5% level, between public expenditures, oil prices, and Per capita national income. Meanwhile, there is an inverse relationship with statistical significance between public revenues and Per capita national income, as follows:

- A 1% increase in public expenditures leads to a 0.46% increase in Per capita national income.
- A 1% increase in public revenues leads to a 0.346% decrease in Per capita national income.
- A 1% increase in oil prices leads to a 0.582% increase in Per capita national income.

Based on the above, the validity of the study's hypotheses can be summarized as follows:

- The first hypothesis is partially accepted. The results indicate that public expenditure has a positive and statistically significant effect on per capita income in the short term, while public revenues do not show a significant impact during the same period.
- The second hypothesis is accepted. This hypothesis posits a long-term relationship between fiscal policy instruments and inclusive growth. The findings reveal a positive and statistically significant long-term association between public expenditure and per capita income, whereas public revenues are negatively and significantly related to per capita income.
- The third hypothesis is accepted. The analysis highlights that the nature and magnitude of fiscal policy effects vary between the short and long term. Specifically, public revenues have no significant short-term effect but exhibit a negative and significant long-term impact, while public expenditure maintains a consistently positive effect in both periods.

The results of the study confirm that public expenditures contribute to increasing per capita income in US dollars in Algeria, which aligns with economic theory. As public expenditures increase, economic activity rises, which in turn stimulates production and contributes to higher per capita income, thus reducing poverty levels. However, what is evident from the results is the inefficiency of public expenditures in combating poverty, as there is a weak effect, especially in the short term. This indicates a lack of flexibility in the production system's response to increased economic activity through expansive fiscal policies, and highlights significant waste in public expenditure allocations. Consequently, there is suboptimal allocation of financial resources directed toward the economy, confirming the strong presence of the crowding-out effect in the Algerian economy.

Regarding public revenues, the results indicate an inverse relationship between public revenues and per capita income, which also aligns with economic theory. A portion of public revenues consists of deductions imposed by the government on individuals' incomes, thus representing a percentage of individuals' income.

4.1. Recommendations:

Based on the foregoing, the study recommends the following:

- Enhancing the effectiveness of public expenditure: Given the findings that public spending has a limited impact on per capita income in both the short and long term, the study recommends increasing investment in key productive sectors such as infrastructure, education, and healthcare to improve individual welfare and achieve

sustainable inclusive growth. Conversely, unproductive and unnecessary consumption expenditures should be reduced within the framework of an expenditure rationalization policy.

- Reconsidering the structure of public revenues: Since the long-term results showed a negative relationship between public revenues and per capita income, it is advisable to review tax policies to reduce the burden on producers, stimulate production, and thereby increase income, while maintaining a balance between state financing and the promotion of inclusive growth.
- Enhancing the flexibility of production in the Algerian economy: The limited effectiveness of fiscal policy, resulting from the inefficiency of public spending on inclusive growth and the negative impact of public revenues on per capita income in the long term, can be attributed to the lack of flexibility in the Algerian production system. Increased demand resulting from higher public spending or tax incentives exerts pressure on the economy without generating a proportional increase in output. Therefore, the study recommends improving the responsiveness of the Algerian economy to demand increases generated by public expenditure in order to maximize the effectiveness of public investment, reduce the crowding-out effect, and contribute to inclusive growth and improved individual welfare.
- Based on the previous findings, the study recommends stimulating production in the most efficient sectors and those that use labor intensively in order to alleviate poverty. Additionally, efforts should be made to enhance the flexibility of the production system in the Algerian economy, making it more responsive to increases in aggregate demand for goods and services resulting from higher public expenditures. This would make public spending more efficient and reduce the crowding-out effect in the economy.

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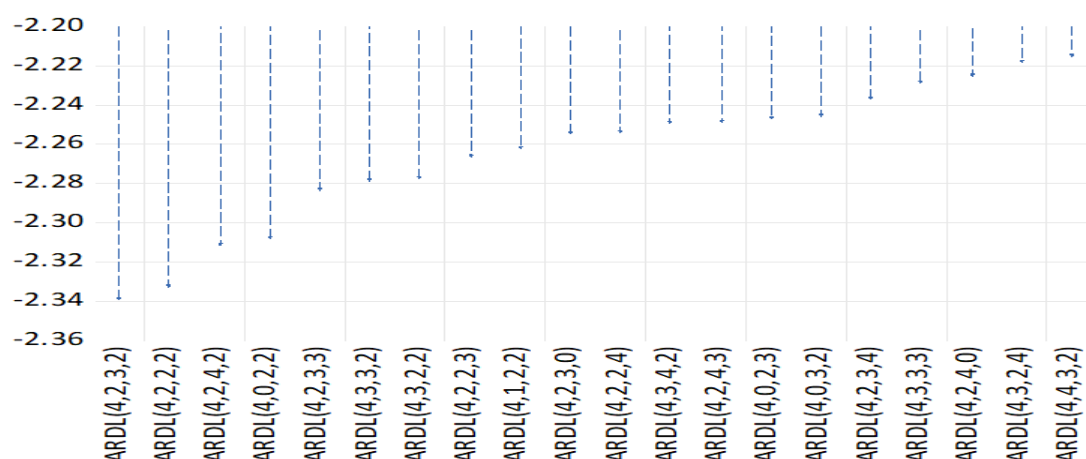
6. Appendices

Appendix .1. Results of stability tests using the ADF test at a significant level of 5%

<u>At Level</u>					
		LNRIECA	LNDEPENC	LNRECE...	LNPRIXPET
With Constant	t-Statistic	-0.4141	-3.4014	-2.9156	-1.1890
	Prob.	0.8953	0.0181	0.0543	0.6673
		n0	**	*	n0
With Constant & Trend	t-Statistic	-1.9932	-3.5839	-2.9099	-2.3852
	Prob.	0.5834	0.0468	0.1724	0.3800
		n0	**	n0	n0
Without Constant & Trend	t-Statistic	0.9938	4.4650	3.7242	0.5202
	Prob.	0.9118	1.0000	0.9998	0.8229
		n0	n0	n0	n0
<u>At First Difference</u>					
		d(LNRIECA)	d(LNDEP...	d(LNRECE...	d(LNPRI...
With Constant	t-Statistic	-5.3213	-4.4435	-5.3788	-6.0821
	Prob.	0.0001	0.0013	0.0001	0.0000
		***	***	***	***
With Constant & Trend	t-Statistic	-5.1808	-5.4317	-5.5498	-5.9643
	Prob.	0.0011	0.0006	0.0004	0.0002
		***	***	***	***
Without Constant & Trend	t-Statistic	-5.0589	-2.0545	-4.1578	-5.8982
	Prob.	0.0000	0.0401	0.0001	0.0000
		***	**	***	***

Source: Prepared by researchers and based on the outputs of eviews 13

Appendix.2. Periods of slowing down according to the Akaike test
Akaike Information Criteria (top 20 models)



Source: Prepared by researchers and based on the outputs of evIEWS 13

Appendix.3. ARDL Bounds Test

Null hypothesis: No levels relationship

Test Statistic		Value				
F-statistic		6.893711				
		10%		5%		1%
Sample Size	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
30	2.676	3.586	3.272	4.306	4.614	5.966
Asymptotic	2.37	3.2	2.79	3.67	3.65	4.66

Source: Prepared by researchers and based on the outputs of evIEWS 13

Appendix.4. Equation for estimating a long-term relationship

Levels Equation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDEPENC	0.460049	0.166318	2.766081	0.0144
LNRECETTE	-0.346903	0.151683	-2.287035	0.0371
LNPRIXPET	0.582812	0.104372	5.584009	0.0001
C	4.141806	0.608581	6.805674	0.0000
EC = LNRIBCA - (0.4600*LNDEPENC - 0.3469*LNRECETTE + 0.5828				

Source: Prepared by researchers and based on the outputs of evIEWS 13

Appendix.5. ECM error correction model coefficient and short-term coefficients

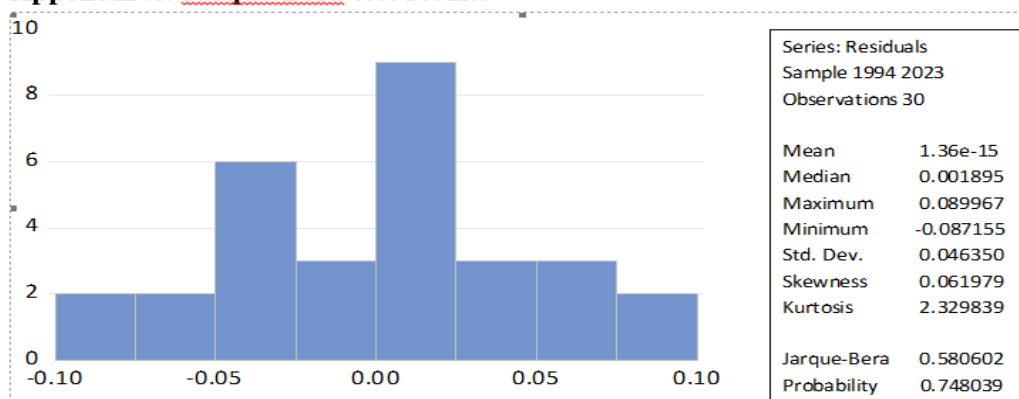
ECM Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNRIBCA(-1))	0.455631	0.134007	3.400060	0.0040
D(LNDEPENC)	0.072868	0.110575	0.658991	0.5199
Dr(LNRECETTE)	-0.057763	0.070051	-0.824587	0.4225
D(LNPRIXPET)	0.324416	0.049261	6.585642	0.0000
CointEq(-1)*	-0.762202	0.115353	-6.607584	0.0000

Source: Prepared by researchers and based on the outputs of evIEWS 13

Appendix .6. Jarque-Bera test results



Source: Prepared by researchers and based on the outputs of eviews 13

Appendix.7. Autocorrelation Test LM:

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic	1.318049	Prob. F(2,13)	0.3012
Obs*R-squared	5.057716	Prob. Chi-Square(2)	0.0798

Source: Prepared by researchers and based on the outputs of eviews 13

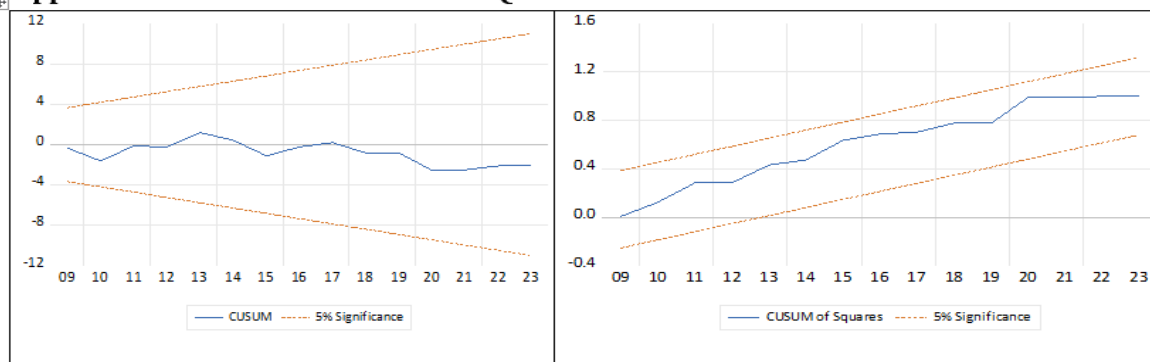
Appendix.8. Heteroskedasticity Test ARCH

Heteroskedasticity Test: ARCH

F-statistic	0.071358	Prob. F(1,27)	0.7914
Obs*R-squared	0.076441	Prob. Chi-Square(1)	0.7822

Source: Prepared by researchers and based on the outputs of eviews 13

Appendix.9. CUSUM AND CUSUMSQ Test for Residuals



Source: Prepared by researchers and based on the outputs of eviews 13