

Oil Revenues and Public Expenditure Policy in Algeria: An Econometric Analysis, 1986–2018

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Abstract

Oil is one of the most important pillars of international trade, a major strategic resource for the economies of both oil-consuming and oil-producing countries, and a source of power in their regional policies. Given that oil export revenues account for more than 95% of Algeria's total revenues, this has created a dependency that is difficult to overcome, posing a genuine threat to economic growth and generating dual structural imbalances in the general budget and the balance of payments, in addition to social and political repercussions. Against this background, the study examines the effects of oil price fluctuations on the orientation of government expenditure policy in Algeria, seeks to highlight the mechanism underlying the policy of expanding government expenditure and its impact on development, and explores the mechanisms through which the global oil market exerts its influence. The study reached a number of findings, including the weakness and limited effectiveness of fiscal policy, its weak linkage with domestic economic activity, and its exposure to external factors. This situation calls for the development of a forward-looking vision for designing a prospective framework aimed at restructuring the economy in a manner that enables it to activate its productive capacity and overcome dependence on a single sector.

Key Words: Oil; oil-based economy; oil price fluctuations; government expenditure.

Introduction

There is no doubt that the various economic perspectives agree on the importance of public expenditure in the development process of any economic system, as it constitutes one of the main determinants of aggregate demand, particularly in terms of its emphasis on the expansion of expenditure. Accordingly, Algeria adopted, during several periods of its history, ambitious expenditure policies whose main objective, in accordance with Keynesian economic theories, was always to stimulate the national economy and indirectly increase economic growth rates by influencing the macroeconomic indicators of the national economy. This was made possible by exploiting the improved financial position resulting from the increase in the price of Algerian oil, albeit with some fluctuations.

The Algerian economy has experienced repeated shocks, primarily due to its weak diversification, which has made its production structure fragile and unable to keep pace with the country's development ambitions. Algeria is among the countries whose economy is based on revenues from raw materials, foremost among which is oil, which accounts for approximately 98% of total Algerian exports. The macroeconomic variables of the national economy have frequently been affected by fluctuations in oil prices in international markets. However, the degree of impact of this relationship may not exhibit the same level of interconnectedness, particularly because the Algerian economy has suffered, and continues to suffer, from distortions in its production structure and from the

ineffectiveness of financial policies directed towards its development. This has resulted in a relative stability of macroeconomic variables in the Algerian economy.

The findings reached in the analytical part of this study revealed the considerable depth of structural imbalances within the Algerian economy as a result of applying a theory that requires a flexible productive apparatus, namely Keynesian theory, based on increasing effective aggregate demand. The application of this theory increased the contradictions within the Algerian economic system due to the continued rigidity characterizing the productive apparatus. This led to meeting the increased demand through imports, with the consequent absorption of the resources generated by exports to such an extent that the quantity of exported hydrocarbons became a new variable on the scene that may have a significant impact in the future if the situation is not addressed.

Based on the foregoing, and with the aim of providing greater precision to the findings presented in the analytical part, we will employ econometric tools that enable us to determine the magnitude of the impact exerted by the variables targeted by fluctuations in oil prices on the course of the indicators constituting the macroeconomic stability system in Algeria during the period 1986–2018. This will be achieved by estimating elasticities from a mathematical perspective, based on regression models that are compatible with economic theory and practical reality and consistent with statistical tests. This is what we will address in this chapter through the causal relationship between petroleum taxation arising from oil-price fluctuations, government expenditure, and subsequently the macroeconomic variables that have generated extensive debate and continued investigation among economic thinkers. Accordingly, we will seek, through the following sections, to analyse and measure the extent to which fluctuations in oil prices affected public expenditure and, subsequently, the macroeconomic variables of Algeria during the period 1986–2018, using appropriate econometric methods.

Section One: The Role of Oil Revenues in Shaping the Features of Expenditure Policy in Algeria

Section Two: Econometric Modelling of the Effect of Oil Price Fluctuations on Expenditure in Algeria (1986–2018)

Section Three: Examining the Effect of Expenditure on Economic Equilibrium Indicators in Algeria (1986–2018)

Section One: The Role of Oil Revenues in Shaping the Features of Expenditure Policy in Algeria

The disturbances affecting oil prices as a result of the continuous and multiple changes occurring in the global economic environment have a significant impact on the macroeconomic variables of oil-producing countries, and Algeria is one of them. Its macroeconomic indicators are certainly not immune to these effects, as such disturbances may either paralyse or enhance the performance of the national economy. What, then, are the channels through which oil price fluctuations affect the macroeconomic indicators of an economy such as the Algerian economy?

First: Channels for the Transmission of Oil Price Fluctuations to Macroeconomic Indicators in Algeria

In this regard, numerous studies have provided evidence of the existence of transmission channels through which such price fluctuations feed into the economy by affecting macroeconomic variables. Among these studies is that of Lescaroux and Mignon (2008, p. 11), as well as the study by Weiqi Tang, Libo Wu, and ZhongXiang Zhang (2008, p. 11), which examined the effect of oil shocks on economic performance using China as a case study. The latter study sought to fill a gap resulting from the neglect of developing countries and the extent to which they are affected by oil shocks, despite the extensive economic literature addressing the negative economic effects of oil-price shocks on advanced economies. It focused on the mechanisms of oil-price transmission and how these prices are transmitted to the real economy.

A study by Abdelrazak Fares Al-Fares (2009) indicated that the events occurring after 2000 were entirely different from what had occurred previously. Accordingly, he identified three channels

through which oil price fluctuations are transmitted to macroeconomic indicators (Idris, 2015–2016, pp. 234–241):

Supply side: An increase in oil prices leads to higher government revenues, which are reflected in increased public investment and current expenditure. This, in turn, stimulates the private sector to increase its investments and its share of economic activity. Taken together, these developments lead to an increase in supply in the economy.

Demand side: An oil boom will logically lead to an increase in the volume of liquidity, as a result of the transfer of wealth, among the government, the private sector, and individuals. Consequently, demand for goods and services will also increase, leading to the emergence of inflation. This, in turn, results in a decline in individuals' real incomes and in the disposable income available to households and individuals.

Trade position: Economic theory suggests that different supply and demand shocks have different effects on the oil trade balance and the non-oil trade balance in both oil-exporting and oil-importing countries. An increase in oil prices undoubtedly improves the trade position of oil-producing and exporting countries, as this increase raises the value of exports and consequently improves the trade balance and the balance of payments. See also Boualchour (2012, p. 36).

Second: The Quantitative Surge in Oil Financial Surpluses at the Beginning of the Third Millennium

From 2004 until the second half of 2008, oil prices recorded a sustained increase. The average price of a barrel of Brent crude rose from USD 36 in 2004 to USD 145 in July 2008. The price of the OPEC basket also exceeded USD 90 per barrel in 2007 and reached USD 135 per barrel in July 2008. This increase contributed to the emergence of new economic patterns and decisive geopolitical and speculative decisions.

These surpluses had a positive impact on the economic indicators of oil-producing countries, including Algeria, where the hydrocarbon sector accounts for more than 97% of total exports. In addition to the increase in the price of Algerian Saharan Blend crude, which is considered the second most expensive oil after Nigerian oil within the OPEC basket, the price of Algerian oil increased from USD 54.64 per barrel in 2005 to USD 74.66 per barrel in 2007. Algeria also benefited from an increase in its share of crude oil exports within the OPEC production quotas, which rose from 0.741 million barrels per day in 2003 to approximately one million barrels per day in 2005, and then exceeded 1.25 million barrels per day in 2007 (Agence Nationale de Promotion du Commerce Extérieur [ANPCE], 2009).

As a result of this increase, the various balances recorded unprecedented surpluses. The trade balance reached USD 25.6 billion in 2005, rising to USD 33.1 billion in 2006 and then exceeding USD 33 billion in 2007. Current external balances also grew by more than 60% during the 2005–2007 period. This was accompanied by a substantial increase in foreign exchange reserves, which rose from USD 70.9 billion at the end of August 2006 to USD 110.8 billion and USD 143.3 billion at the end of 2007 and 2008, respectively. The budget also recorded surpluses, reflected in the positive development of the Revenue Regulation Fund, which exceeded DZD 3,000 billion in mid-2006 and DZD 4,000 billion during the same period in 2008 (National Economic and Social Council, 2008).

Reports presented by the Governor of the Bank of Algeria before the People's National Assembly during the 2000–2005 period indicated that the Algerian economy had regained growth during the early years of the third millennium. Gross domestic product increased markedly, rising from 3.2% in 1999 to 4.1% in 2002 and then to 6.8% in 2003, before exceeding 5% in 2005. Foreign trade generated a current-account surplus exceeding USD 11.12 billion in 2004. In addition, unemployment declined from 29% in 1999 to 17.7% in 2004, while the inflation rate stood at 3.6% in 2003. The public treasury also recorded a surplus estimated at DZD 514.3 billion in 2004. Both the agricultural and services sectors achieved considerable growth, with the former contributing 20.6% to non-hydrocarbon value added in 2004, while the latter contributed 47.1% during the same year, in

contrast to a decline in the growth of the public and private industrial sectors (Abderrahmane, n.d., p. 210).

It is true that these financial surpluses resulting from petroleum taxation, with the beginning of the third millennium, contributed to Algeria's return to the threshold of the global economy through its oil exports, after it had relatively surpassed this situation in 1998. However, they had a negative effect on growth outside the hydrocarbon sector. In this regard, the overall growth rate of the industrial sector reached only 0.8% in 2007, while the agricultural sector contributed only 8%. The strategy of relying on small and medium-sized enterprises specifically intended to absorb unemployment also failed, leaving unemployment rates relatively high: 12% in 2006, before declining slightly to 11% in 2007 (Abderrahmane, n.d., p. 210).

Third: Orientations of Algerian Government Expenditure Policies for Promoting the Algerian Economy amid Oil Price Crises

Repeated declines in oil prices reduce the government's fiscal capacity and compel it to adopt a state-driven growth approach for distributing rents and financing generous government subsidies. Conversely, this exposes the government to pressure to reduce public expenditure during the years following oil-price crises. To cover some of these deficits, it repeatedly resorts to gradually increasing certain taxes and customs duties, which has led to successive increases in the prices of gasoline, cigarettes, alcohol, and some imported goods, while maintaining its commitment to refraining from reducing subsidies imposed on essential goods and services, particularly in the areas of education, healthcare, and housing.

I. Orienting Expenditure Policy amid Oil Price Crises

The causes of oil-price crises are largely confined to imbalances between supply and demand in the global oil market. The factors underlying increases in oil supply have included economic factors related to the growth of production outside OPEC, whose influence has declined, as well as geopolitical factors resulting from manoeuvres by oil-consuming countries and others by oil-exporting countries aimed at exerting pressure on those that oppose their policies, such as Saudi Arabia's attempt to punish Iraq for halting the war following the 1986 crisis and its subsequent attempt to exert pressure on Iran following the 2014 crisis. These developments had a considerable impact on the orientation of Algeria's economic policies, particularly its expenditure policies. The measures adopted by the state were effective in restraining consumption and consequently reducing imports while awaiting an improvement in oil prices. However, they were ineffective in building an economy diversified in its sources of income and in reducing dependence on the oil sector.

Oil crises have a severe impact on the Algerian economy. As soon as oil prices collapse, numerous economic indicators shift from a state of surplus or equilibrium to a state of deficit, including the trade balance, balance of payments, and general budget. Such crises reveal the weaknesses of the national economy and its dependence on the oil sector and expose its limitations.

The measures adopted by the authorities have centred on restraining domestic consumption through currency depreciation and increasing inflation in order to limit purchasing power and, consequently, aggregate demand for goods, while attempting to reduce the import bill by regulating imports through a quota system pending an improvement in oil prices.

Algeria increased its protectionist measures from 2015 onwards to reduce the import bill and encourage domestic production in non-oil and non-gas industries. The government imposed additional restrictions to limit the depletion of foreign currency through a series of measures, the most important of which was the introduction of import quotas for certain products, such as automobiles. In 2018, the Algerian authorities imposed an indefinite suspension on the importation of nearly 850 products, with this list being periodically updated.

The government used the surpluses available in public finances and held in the Revenue Regulation Fund to mitigate the effects of declining oil prices and orient its expenditure policy in a manner that

would permit and facilitate the adoption of an optimal model for managing financial resources. It allowed the exchange rate to decline as a measure to increase oil revenues denominated in US dollars when converted into Algerian dinars. It also adopted decisive measures in the 2016 budget to consolidate the fiscal adjustment process by making further progress in rationalising expenditure, reducing the costs borne by public finances, and generating financial savings. Budget expenditure in 2016 declined by 8.8% compared with 2015. Estimated operating expenditure decreased by 3.3%, while capital expenditure declined by 16%. Austerity measures included the gradual cancellation of non-recurring expenditures through reductions in public investment, including the freezing of tramway and hospital projects; reductions in imports accompanied by the introduction of import licences for products such as automobiles and cement; reductions in public-sector recruitment; and the activation of retirement procedures after the age of 60 (Merghit, 2020, pp. 4–5).

The Algerian authorities made considerable and far-reaching efforts to mitigate the effects of external oil-price crises and to orient public expenditure policy in the country in a manner closer to soundness and equity. Algeria placed the Revenue Regulation Fund as its first line of defence and also began searching for alternative economic sources, given that this commodity is exposed to considerable fluctuations. To ensure the success of this orientation, the authorities worked to:

1. Promote growth in economic sectors outside the hydrocarbon sector and direct public expenditure towards investment in industrial projects in order to advance the Algerian industrial sector.
2. Develop alternative energy sources in Algeria.
3. Promote other vital sectors, such as tourism and agriculture, and encourage investment in the tourism sector.
4. Exert external influence through the weight of Algerian diplomacy in order to control oil production and limit supply in the oil market.

It can be stated unequivocally that an increase in oil prices for Algeria will inevitably produce positive results in the short term, but in the long term it will lead to negative outcomes. To overcome these outcomes, long-term macroeconomic policies must be established as alternatives for advancing the Algerian economy. Among these were the proposals discussed by members of the Algerian Parliament (Arab Democratic Centre for Strategic, Economic and Political Studies, 2017):

1. Members of Parliament and the government considered the government's inability to promote non-hydrocarbon exports to remain a weakness. Therefore, greater investment should be injected into various sectors, including agriculture, industry, services, and tourism, in order to increase the rate of non-hydrocarbon growth and generate added value capable of gradually replacing hydrocarbon exports.
2. Members of Parliament also adopted a policy aimed at preventing the transfer of foreign currency abroad, recovering transferred funds, and combating money laundering, which had assumed significant proportions during the preceding period.
3. In 2013, the Algerian government reconsidered the Hydrocarbons Law and introduced fundamental changes, most notably the provision of tax incentives and the promotion of shale gas as a renewable energy source alongside solar and wind energy.
4. Improve the efficiency of equipment in energy consumption and reduce the quantities consumed while keeping pace with technological development in various economic, social, and political fields.
5. Strengthen the role of the private sector in order to promote competition and free trade, attract competencies, and consequently reduce various forms of corruption, including bureaucracy.

II. A Future Outlook for the New Economic Model of the New Algerian State

Alongside the emergency measures, Algeria adopted a new and different growth policy from those it had pursued during previous periods. This involved focusing on rigour in the management of the

state budget, in addition to adopting a new growth model. The content of the growth model adopted by the state to address the 2014 oil crisis can be grouped into two principal axes: the public finance axis and the economic diversification axis (Laaib, 2017, p. 38).

Public finance axis: The public finance axis was considered the foundation and driving force of the new model, as it comes first and provides the basis upon which the economic diversification axis depends. Without achieving its objectives, the subsequent stages cannot be initiated. Its objectives are short-term and were expected to be achieved by the beginning of 2019. They include:

- Strengthening non-hydrocarbon tax revenues in a manner that ensures coverage of operating expenditure.
- Reducing the budget deficit to the greatest extent possible.
- Mobilising additional resources in the capital market.

In fact, the public authorities began reducing the deficit by focusing on lowering imports of goods and services under the slogan "Consume Algerian" and rationalising public expenditure in various ways, without affecting the state's subsidy policy or employees' wages. A comparison of operating expenditures in the finance laws for 2016 and 2017 clearly demonstrates this orientation towards expenditure rationalisation, as they declined from 3.4807 billion in 2016 to 8.4591 in 2017, following the deterioration of the deficit in 2015, which exceeded 7%. This deficit was financed primarily through the Revenue Regulation Fund, which contains the difference between actual petroleum taxation and the petroleum taxation adopted in the state budget.

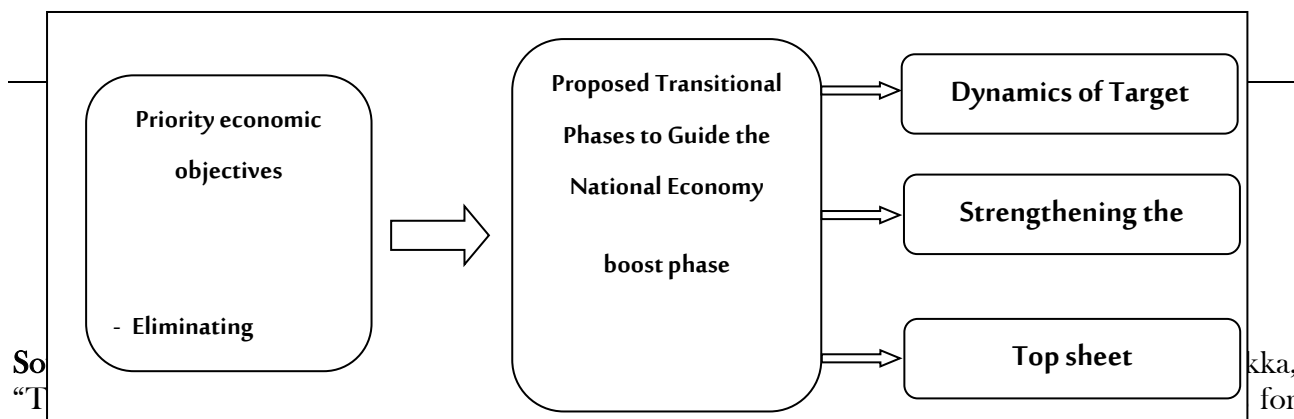
Economic diversification axis: This requirement was incorporated as a fundamental pillar of the new economic model, which established a set of objectives for the second stage, 2020–2030, including:

- Achieving an annual increase of 5.6% in gross domestic product outside the hydrocarbon sector during the 2020–2030 period.
- Increasing per capita gross domestic product by 3.2 times.
- Doubling the share of manufacturing industries in value added to 10% by 2030.
- Modernising the agricultural sector in a manner that achieves food security.
- Achieving an energy transition that ensures a halving of the annual growth rate of energy consumption, from 6% in 2015 to 3% in 2030.
- Diversifying exports in a manner that enables the financing of rapid economic growth.

The new economic growth model in Algeria targeted several long-term objectives aimed at ensuring the sound orientation of expenditure policy within the national economy, freeing the country from rentier dependence, and achieving the energy transition. To reach these objectives, the strategy was programmed according to three fundamental stages (Bouaziz & Ben Khadija, 2017, pp. 91–93):

A. The Launch Phase of Model Implementation, 2016–2019: This phase focused primarily on correcting the fiscal imbalance in the state budget, with the aim of generating surpluses that would allow the diversification of revenue sources to begin around 2020. This phase was regarded as preliminary because the decline in tax revenues did not permit the achievement of economic stability in a country such as Algeria, which has a particular dependence on oil revenues as a source of expenditure financing. The latter declined from 9.7% in 2014 to 9.32% in 2015. Consequently, during the launch phase, a treasury plan was adopted to provide a framework and strict control for public expenditure by establishing ceilings on state expenditure. On the revenue side, this phase involved maximising the mobilisation of financial resources in the money market and increasing the effectiveness of public treasury instruments in financing the economy, thereby allowing the various economic sectors to increase their contribution to value added.

Figure 1. Guiding Plan for the Algerian Economy in the Medium Term



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Success,” presented within the proceedings of the National Conference “The Challenges Facing the Algerian Economy in Light of the Current Local and International Conditions: What Opportunities for the New Economic Model?”, Faculty of Economic, Commercial and Management Sciences, Abdelhamid Mehri University Constantine 2, Algeria, October 2017, p. 272.

B. The Transitional Phase, 2020–2025: The transitional phase constitutes a starting point for achieving economic diversification and the energy transition. At the same time, it represents a phase of adjustment and adaptation to the new conditions, primarily reflected in the beginning of contributions by other sectors to value added and an increase in the annual growth rate of gross domestic product to 5.6%. This would help reduce the gap between imports and exports outside the hydrocarbon sector, particularly in agriculture and tourism, and reduce domestic hydrocarbon consumption through reliance on renewable energy.

C. The Stabilisation Phase, 2026–2030: The stabilisation phase is perhaps the most difficult stage in implementing the model because of the stakes and challenges involved in achieving major economic balances and keeping pace with technologies, and consequently in achieving the model's fundamental axes. It therefore represents a definite challenge for the various actors and researchers seeking opportunities to move the Algerian economy away from rentier dependence and transform the country from a developing state into an emerging state. It also constitutes a challenge in terms of identifying alternative opportunities if the objectives envisaged by the new economic model are not achieved and the deficit crisis worsens. In order to achieve the stages referred to above, the model requires three strategic axes, which we propose in the following plan:

The diagram provides, in a concise manner, an overview of the primary or priority objectives sought for a rentier economy such as the Algerian economy. Accordingly, at the sectoral level, diversification should be achieved through the development of new fields of activity, which requires accelerating growth. The objective for industry outside the hydrocarbon sector is to reach 10% of value added by 2030. Achieving this level requires generating industrial value added at a significant rate, while strengthening investment systems in order to achieve structural transformation. This transformation requires linking growth in the non-hydrocarbon sector to developments in the productivity of invested capital. This, in turn, requires proponents of this future-oriented approach to work toward targeting both the private and public sectors simultaneously. This requires:

- Liberalizing private investment in growth-generating sectors;
- Adopting a strong policy for technology transfer and intensifying the relationship between the university and the enterprise.

All of this should be accompanied by the necessary sustainability of external transactions, characterized by positive and stable performance, in the context of accelerated growth and economic diversification outside the hydrocarbon sector, with expected annual GDP growth of 5.6%, while hydrocarbon-related exports are expected to record growth of no more than 3% during the initial years of the transformation. The document on the New Economic Growth Model emphasized that, during its transformation by 2030, the national economy would have to overcome four major constraints:

- The degree of change in the production structure;

- The development of domestic debt;
- External solvency;
- The energy transition, or integration into the global energy-transition process.

Axis Two: Econometric Modelling of the Effect of Oil Price Fluctuations on Expenditure in Algeria (1986–2018)

Revenues generated by the hydrocarbon or oil sector in foreign currency are among the most important factors that have significantly contributed to the development of Algeria's fiscal policies. The sound conduct of fiscal policy and the stability of public-debt and budget-deficit rates depend primarily on petroleum taxation. Therefore, the ability of fiscal policy to address the budget deficit depends primarily on fluctuations in oil prices in international markets, making the effectiveness of expenditure policy dependent on the levels and extent of fluctuations in oil prices in the international market.

Operating expenditures increased continuously, particularly from 1999. For example, they rose from DZD 774.7 billion in 1999 to DZD 4,925.1 billion in 2012. They represented the largest share of expenditure throughout this period. Their increase was attributable to several factors, most notably the rise in wage costs and social transfers, in addition to the repayment of public debt. It should also be noted that the rate of coverage of operating expenditures by non-hydrocarbon revenues remained stable in 2010 at around 54.8%, after declining from 2006 to 2008. In 2012, however, the rate of coverage of current expenditures by non-hydrocarbon revenues continued to decline, reaching 45.1%, amid the continued strong expansion of these expenditures, particularly current transfers, including price subsidies and transfers to local authorities, among others.

Equipment expenditures also experienced a noticeable increase from the beginning of the third millennium. This was due to Algeria's implementation of numerous development projects during this period. The objective was to improve the performance of the national economy by establishing numerous development projects aimed at promoting economic development and increasing economic growth rates through stimulating aggregate demand and supporting activities that generate wealth and value added and provide employment opportunities, particularly agriculture, fisheries, and productive enterprises, especially medium-sized and small enterprises, in order to support economic development. With the government's adoption of this policy and programme, equipment expenditures increased as a result of the expansion in the volume of public expenditure, primarily directed toward investment operations. The foundations and principles of this policy became evident beginning in 2001, when investment expenditure recorded an increase of 36.13% compared with 2000. This component of expenditure continued to increase with the financial comfort resulting from the growing oil rent through the state's development plans.

These increases in the two components of public expenditure, whose features became more pronounced from the beginning of the third millennium, would not have been possible without the groundwork provided by previous structural reforms resulting from constraints imposed by international financial institutions on the government at that time, together with political will aimed at establishing sustainable development in order to foster political, economic, and particularly social stability in the country. On the other hand, they were also associated with the exploitation of the positive price boom that prevailed in oil prices and provided healthy signs in the oil market, at least in the short term. Therefore, the impact of oil price fluctuations on public expenditure is clear in both its current and investment components, particularly in a rentier country.

First Subsection: Descriptive Analytical Study of the Model Variables Using the PCA Method

This subsection presents a descriptive analysis of the study sample using the Principal Component Analysis (PCA) method. This method is used to analyse statistical tables on the condition that all the variables in the statistical table are quantitative in nature. It aims to identify a lower-dimensional partial vector space, usually two-dimensional, D2, in the conventional plane. This partial vector space allows

us to obtain a graphical representation while preserving the greatest possible amount of information. The method also helps us study and analyse the relationships among the variables during the study period.

First Branch: Determination of the Study Sample

After obtaining the necessary data and, based on previous studies, we used appropriate statistical tests with the EVIEWS 10 software in order to answer the research questions and test its hypotheses, and subsequently formulate the findings and recommendations. This can be illustrated through an attempt to construct the model linking oil prices to public expenditure through its two components, current and investment expenditure, as percentages of gross domestic product. We therefore took oil prices (OP) as an independent variable and total public expenditure (G) as the general dependent variable, with two subordinate dependent variables, namely current expenditure (GE) and investment expenditure (GT). It should be noted that these variables concern the period 1986–2018, which extends beyond what is approximately stated in the title, “1986–2015,” in order to update and refine the results of the study to cover the current period.

Overall, the study variables can be described as follows:

Table 1: Descriptive Characteristics of the Study Variables

Series	Code	Nature	Source
Oil prices	OP	Annual rate	OPEC, annual reports
Total public expenditure	G	Annual values as a percentage of GDP	World Bank, online statistics; Ministry of Finance, annual statistical reports; National Office of Statistics of Algeria, website; Bank of Algeria, Governors' reports
Total current expenditure (operating budget)	GE	—	—
Total investment expenditure (equipment budget)	GT	—	—

Source: Prepared by the researcher.

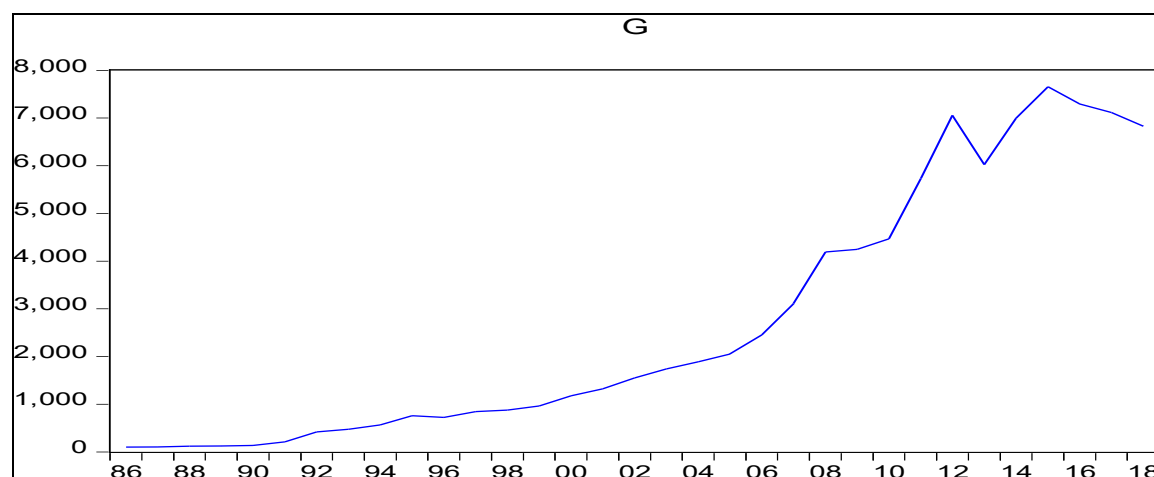
First: Total Public Expenditure

The dependent variable, “public expenditure G,” which represents an important component of aggregate demand, essentially reflects the political orientation toward the financial resources available in response to price fluctuations, whether positive or negative, as expressed through an expansionary or austerity policy according to the financial revenues generated by petroleum taxation. Public expenditure, in general, is defined as follows: “a monetary amount withdrawn from the financial assets of a public legal person for the purpose of satisfying a public need.” We obtained its statistical data from databases extracted from:

- Reports of the Governors of the Bank of Algeria for the years 2010–2018, available on the website of the Ministry of Finance;
- Annual Finance Bills available on the website of the National Office of Statistics (ONS);
- The World Bank database available on its website: worldbank.org.

The following figure illustrates changes in total public expenditure during the study period.

Figure 2: Historical Development of Public Expenditure in Algeria (1986–2018)
Unit: DZD billion



Source: Prepared by the researcher based on the output of the EViews 10 statistical software.

The figure generally shows a progressive increase in public expenditure throughout the period under study, reflecting the increasing role of the state in managing the national economy, according to the financial revenues available during each period. Accordingly, the figure can be divided into three phases. The first phase begins with the oil price crisis in 1986, when the oil price in the world market reached its lowest level of USD 13.53 per barrel, accompanied by stability in total expenditure until 1991, with an average of USD 117.3 billion. After this period, public expenditure experienced a steady increase with a relatively weak upward trend. In 1991, it reached a value of USD 212 billion, rising to DZD 961.7 billion in 1999. With the beginning of the third millennium, the upward trend in public expenditure in Algeria increased by 336% between 1999 and 2008. It then remained relatively stable until 2011, which represented a natural and positive response to the financial shock that affected the US stock markets in 2008. Public expenditure subsequently resumed its increase, reaching DZD 7,058 billion in 2012. It was then affected by the initial signs of the free fall in oil prices, declining to DZD 6,024 billion. The level of expenditure in Algeria subsequently rose to DZD 7,115 billion as a result, on the one hand, of the implementation of the programmes planned by the authorities and, on the other hand, of the depreciation of the Algerian dinar.

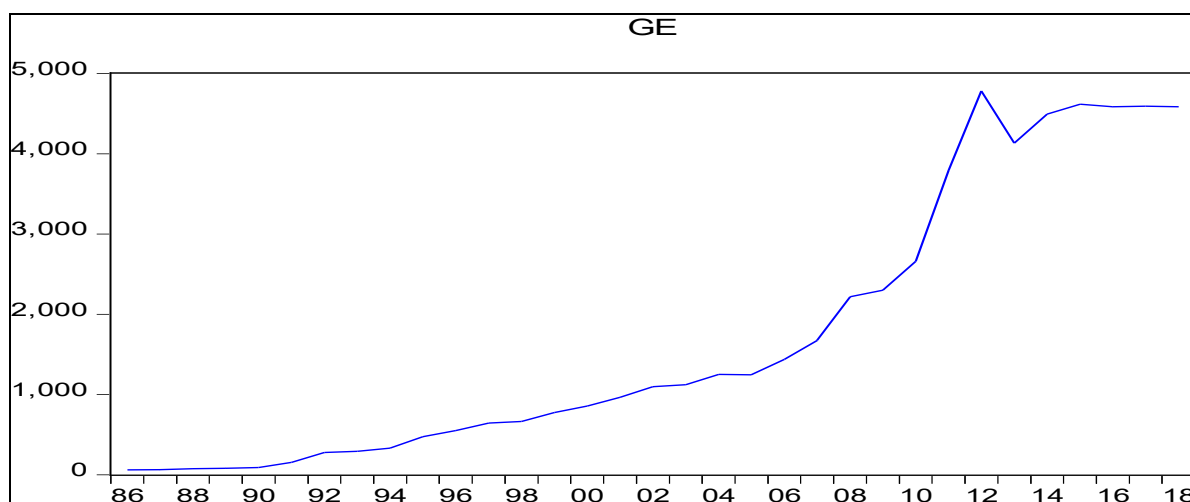
Second: Current Expenditure (Operating Expenditure)

Our understanding of current expenditure is primarily based on governments' recurring financial obligations relating to current expenses, including salaries, subsidy allocations, and expenditure on public services, among others, which the state incurs either directly or indirectly. In general, current expenditure in government budgets is characterized by the difficulty of reducing it, at least in the short and medium terms. Governments often resort to reducing capital expenditure at the expense of current expenditure, which creates evident pressures on these economies when their revenues decline, particularly in oil-producing countries such as Algeria. In such countries, the matter is even more complex and serious, potentially placing considerable strain on public budgets, particularly with regard to salaries, wages, and subsidies. Therefore, the relationship between fluctuations in oil prices and current expenditure is strong, as illustrated by the following figure.

The statistical data were obtained from databases extracted from:

- Reports of the Governors of the Bank of Algeria for the years 2010-2018, available on the Ministry of Finance website: mf.gov.dz
- Annual Finance Bills available on the website of the National Office of Statistics (ONS): ons.dz

Figure 3: Historical Development of Operating Expenditure in Algeria (1986-2018)
Unit: DZD billion



Source: Prepared by the researcher based on the output of the EViews 10 statistical software.

The function presented above, which illustrates total current expenditure as a function of time, shows a positive upward trend from 1986 to 2012–2013. This means that current expenditure increased over the successive government budgets in Algeria during this period. Operating expenditure reached its lowest level during the 1986 crisis, at USD 61.15 billion, and remained relatively stable until 1992, when it recovered and reached DZD 276 billion. It continued to increase until 2008, recording a substantial rise of more than 700%. This development then stabilized as a reflection of the global financial crisis at the time. Current expenditure in Algeria subsequently recorded considerable increases, reaching its highest level of DZD 7,058 billion in 2012.

All these successive increases can be financially justified by the revenues generated from petroleum taxation, which resulted from the increasingly favourable price boom, particularly from the beginning of the third millennium. This period also witnessed, first, Algeria's involvement in a political struggle in which the primary concern was to purchase social peace and, second, the adoption of an expansive social expenditure policy that increased the wage and salary bill and social transfers, among other expenditures. However, the free fall in oil prices at the end of 2013 and the beginning of 2014 placed the Algerian authorities in the context of a growing budget deficit and depletion of foreign-exchange reserves. This compelled the government to shift its expenditure policy from expansionary spending toward an austerity policy. This is reflected in the decline in current expenditure to DZD 4,131.5 billion in 2013, after which current expenditure remained relatively stable, with the arithmetic mean of operating expenditure approaching DZD 4,574 billion.

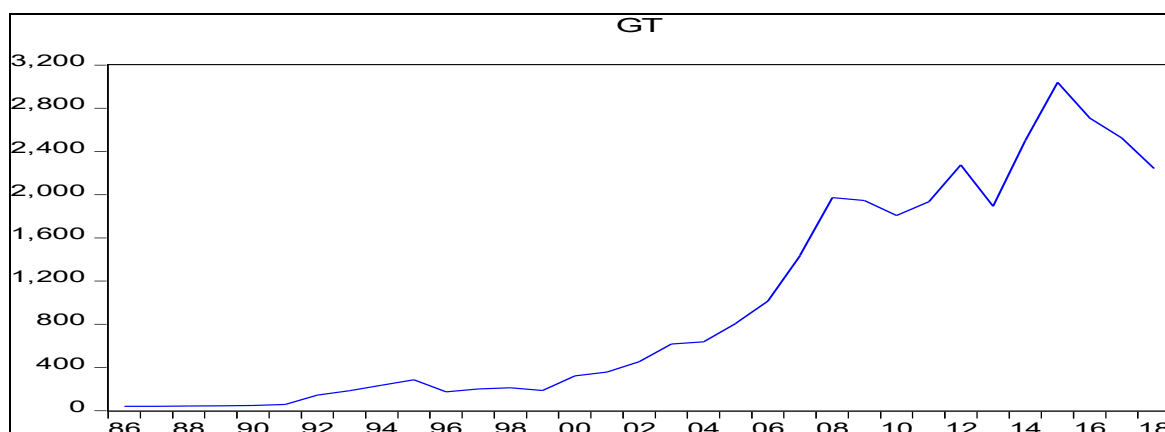
Third: Investment Expenditure (Equipment Expenditure)

As is well known, the capacity of capital expenditure is not limited to providing employment opportunities for local communities; it also contributes to improving, diversifying, and increasing the components of the trade balance, in addition to generating value added through projects resulting from investment expenditure over the medium and long terms. Therefore, capital expenditure involves investing funds to acquire fixed assets that the state uses over extended periods in support of a viable economy in the medium and long term. Accordingly, genuine policy effectiveness lies in determining the type of investment and the value of the amounts allocated to it.

The statistical data were obtained from databases extracted from:

- Reports of the Governors of the Bank of Algeria for the years 2010–2018, available on the Ministry of Finance website: mf.gov.dz
- Annual Finance Bills available on the website of the National Office of Statistics (ONS): ons.dz

Figure 4: Historical Development of Equipment Expenditure in Algeria (1986–2018)
Unit: DZD billion



Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software.

The data generally reveal two extended phases over the study period:

First phase (1986–2000): Relative stability in investment expenditure amounts, with limited fluctuations in the curve. This phase can itself be divided into two periods: the first ranging from [40, 67, 58.3] billion dollars during 1986–1991, followed by a slight recovery in the second period, reaching [144, 321, 93] billion dinars during 1992–2000. This can generally be attributed to Algeria's struggle with the financial difficulties resulting from the deterioration in the prices of its most important product during the 1986 oil price shock, in addition to the political crisis at the time and the structural pressures imposed by international financial institutions in exchange for structural adjustment and the acquisition of external debt to manage the country's deteriorating economy.

Second phase (2000–2018): A substantial increase and pronounced fluctuations in capital expenditure. The increases are attributable to the substantial financial appropriations allocated to the development programmes adopted by the Algerian authorities as an expansionary expenditure policy, in response to the financial comfort that prevailed in the country as a result of rising oil prices. The major fluctuations in capital expenditure, however, were a direct reflection of the 2008 financial crisis and the oil price shock in international markets beginning at the end of 2013. Thus, Algeria's expenditure policy is closely linked to oil prices.

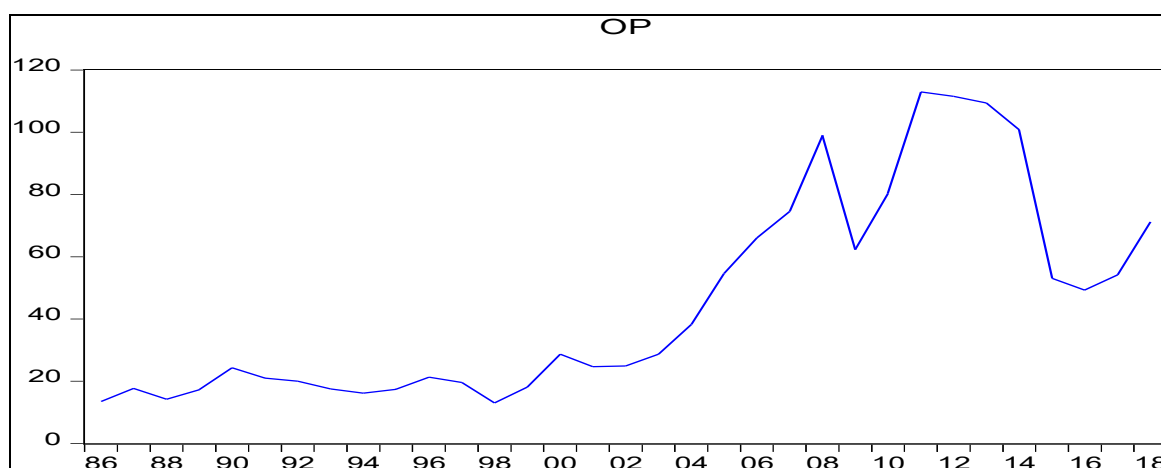
Fourth: Oil Prices

Oil was formerly regarded as a strategic commodity because of the enormous amount of energy it provided for industrial development at the beginning of the nineteenth century and as an effective alternative to the fossil-based energy sources that had prevailed before it, particularly coal. The emergence of oil in different parts of the world transformed the centres of power and influence in the global economy. However, oil has long been described as a strategic commodity, primarily for political reasons, followed by energy-related and environmental considerations, all of which have had a profound effect on fluctuations in its prices. These developments led to the emergence of large multinational companies engaged in exploiting this resource, as well as organizations established to protect the interests of oil-producing countries.

In general, oil prices (OP) are reported on a daily, monthly, quarterly, or annual-average basis. In obtaining the price statistics, we adopted annual averages in order to ensure consistency with the annual frequency of the other economic indicators used as variables in this econometric study. It should be noted that we used the prices of the type of oil extracted from the Algerian Sahara (SAHARA BLEND), based on a database compiled from:

- Annual reports of the OPEC for the years 2010–2018, available on the website: oprec.org
- Annual finance laws available on the website of the National Office of Statistics (ONS), ons.dz.

Figure 5: Historical Evolution of Oil Prices in Algeria (1986–2018)
Unit: US dollars per barrel



Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software.

The graph does not show the fluctuations in prices because they are presented as annual averages. Consequently, the function appears monotonic, unlike the pattern observed when daily prices are presented. This supports the high volatility of prices and their sensitivity to factors beyond the commodity supply and demand conditions in the global market. The Algerian economy experienced a genuine crisis in 1986, which revealed deep structural weaknesses in its economy. This was reflected in the fact that the country's only financial resources originated from petroleum taxation, which was primarily linked to oil prices. Oil prices fell to a low of USD 13.53 per barrel. However, this price recovered during the Gulf War at the beginning of the 1990s, reaching more than USD 21 per barrel, and remained subject to fluctuations around this level until 1999, before recording a significant increase in 2000 to USD 28.6. This price boom continued to rise until 2008, reaching approximately USD 100, before falling to USD 62.25 as a result of the global financial crisis affecting the U.S. real estate markets. Prices then recovered again, reaching their peak in 2011 at USD 112.9. However, as global demand for oil declined relative to supply in 2014 and thereafter, the price curve began to fall, creating a genuine crisis for the national economy in terms of financial resources derived from petroleum in relation to the large-scale expansionary expenditure in both its current and investment components.

Second Branch: Means and Standard Deviations of the Variables

Table 2: Descriptive Characteristics of the Study Variables

Variables	Minimum	Maximum	Average	Standard deviation	Coefficient of variation
OP	13.02	112.94	45.33	32.96	0.73
G	101.82	7656.30	2707.00	2664.09	0.98
GE	61.15	4782.60	1725.40	1699.84	0.99
GT	40.22	3039.30	981.61	987.79	1.01

Source: Prepared by the student based on the outputs of the XLSTAT-2016 statistical software.

The above table presents the time series of the variables under study together with descriptive statistics showing the minimum and maximum values of each variable, the arithmetic mean of the series, its standard deviation, and the coefficient of variation. The latter can be used to assess the stability of the series. The results show that oil prices were the most stable variable, with a coefficient of variation of 0.73, followed by total public expenditure and total current expenditure, with coefficients of variation of 0.98 and 0.99, respectively. Capital expenditure was the least stable, with a coefficient of variation of 1.01.

- **Oil Prices (OP):** The time series for oil prices recorded a minimum value of USD 13.02 in 1998 and a maximum value of USD 112.94 in 2011, with an arithmetic mean of USD 45.33 over the study period and a standard deviation of 32.96.
- **Total Public Expenditure (G):** The minimum value of the public expenditure series was DZD 101.82 billion in 1986, whereas the maximum value of this variable was DZD 7,656.3 billion in 2015, with an arithmetic mean of DZD 2,707 billion and a standard deviation of DZD 2,664.09 billion.
- **Total Current Expenditure (GE):** The values of the time series for current expenditure ranged from a minimum of DZD 61.15 billion in 1986 to a maximum of DZD 4,782.6 billion in 2012. The mean of these values was DZD 1,725.4 billion, while the deviation of the values from their mean reached DZD 1,699.84 billion.
- **Total Investment Expenditure (GT):** As for the GT time series, its values ranged from DZD 40.22 billion in 1987 to DZD 3,039.3 billion in 2015. The arithmetic mean was DZD 981.61 billion, with a standard deviation of DZD 987.79 billion.

First: Correlation Matrix

Correlation is a statistical analysis of two variables that measures the strength of the association between them and determines the direction of change in their linear relationship. Both Spearman's and Pearson's correlation coefficients are restricted to the range [-1, +1]. A value of ± 1 indicates a perfect linear correlation between the two variables, whereas a value of 0 indicates that there is no linear relationship between them. The negative (-) and positive (+) signs indicate the direction of the linear relationship, whether positive (direct) or negative (inverse).

Table 3: Correlation Matrix

Variables	OP	G	GE	GT
OP	1	0.81	0.80	0.81
G	0.81	1	0.99	0.98
GE	0.80	0.99	1	0.96
GT	0.81	0.98	0.96	1

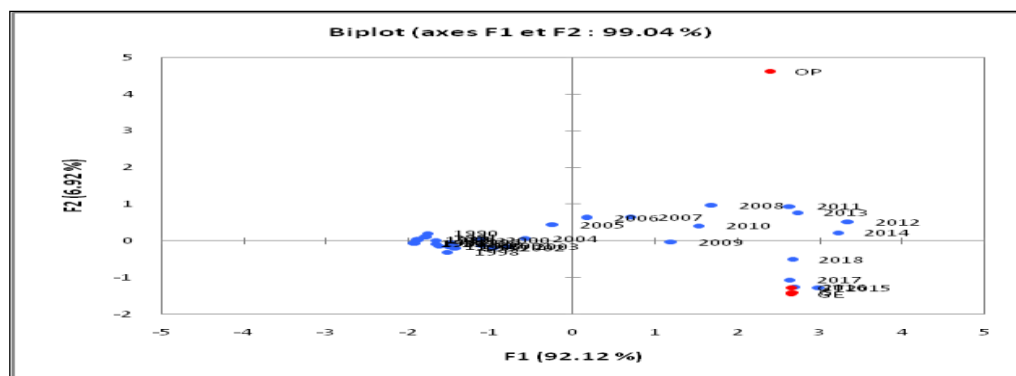
Source: Prepared by the student based on the outputs of the XLSTAT-2016 statistical software.

The figures in the preceding table clearly demonstrate a strong linear correlation between the independent variable, oil prices (OP), and the dependent variables, public expenditure (G), current expenditure (GE), and investment expenditure (GT). The correlation coefficient was 0.80 between (OP) and (GE), and 0.81 between (OP) and (GT). These are positive values close to unity, which is consistent with the economic reality, as the Algerian economy has been characterized as a rentier economy dependent on revenues from petroleum resources, which constitute the largest share of the financing of public expenditure in both its components. This pattern can be observed throughout the study period.

Second: Graphical Representation of the Variables during the Study Period

As shown in the figure below, the first axis explains 92% of the information contained in the initial data table, whereas the second axis explains approximately 7% of the information contained in the initial data table. Therefore, the first plane explains 99% of the information contained in the initial data table. This is a highly substantial proportion that can be relied upon in the analysis and study. This high explanatory capacity indicates a high degree of homogeneity among the study variables and a strong inertia in the initial data table, reaching 99%, which represents a high proportion.

Figure 6: Graphical Representation of the Variables and the Study Period (1986–2018)



Source: Prepared by the student based on the outputs of the XLSTAT-2016 statistical software.

The graphical representation of the variables shows that all variables are acceptable for analysis and study because of their distance from the origin. Given the small distance between the oil price variable (OP) and the expenditure variables, we can confirm the existence of a positive relationship between oil prices and expenditure in Algeria during the study period, as also confirmed by the correlation matrix analysis. Regarding the relationship between the variables and the axes, all variables have a positive correlation with the first principal component.

Returning to the preceding figure, we note that the beginning of the study period (1986–2003) is represented well on the first axis and with negative values. This means that Algeria experienced low oil prices and low levels of expenditure in both its components during this period, particularly since the Algerian economy during this period was accompanied by internal and external pressures that made the country's development process somewhat difficult. These included the 1986 oil price crisis, the 1988 political crisis, and the resulting social crisis, commonly referred to as the Black Decade. Economically, the period also witnessed several events that shook Algeria's economic structure, the most important of which were:

- Periodic preparations for the transition to a market economy in the face of external debt;
- Attempts to join the World Trade Organization (OMC) and the conditions resulting from such attempts;
- Financial restructuring of public enterprises and the resulting debt owed by the state;
- Pressures from international financial organizations, namely the IMF and the World Bank.

As for the end of the study period (2003–2018), it is well represented on the first axis with positive values. This means that Algeria recorded increases in oil prices and expenditure in both its components during this period, through the adoption of an unprecedented expansionary policy reflected in a set of medium-term programmes:

- Economic Recovery Programme (2001–2004);
- Economic Growth Support Programme (2005–2009);
- Human Resources Development Programme (2010–2014).

In addition, the Revenue Regulation Fund was established and the reference oil price in the 2008 Finance Law was changed to USD 37. Some positive indicators were achieved following the adoption of these reforms, including:

- An improvement in the trade balance;
- An unprecedented increase in foreign exchange reserves;
- A substantial reduction in debt;
- High investment rates;
- Acceptable growth and inflation rates;
- Diversification and improvement in the performance of the banking system.

Second Section: Studying the Effect of Oil Price Fluctuations on the Components of Expenditure in the Short Run

In order to study the effect of oil price fluctuations on the components of expenditure, we introduce logarithmic transformations of the study variables. This is intended to reduce the values of the variables, particularly expenditure variables, and to reduce disturbances in the series, thereby making them more suitable for the normal distribution. The use of logarithms in econometric models also allows the model coefficients to be interpreted in terms of elasticities.

First Subsection: Testing the Stationarity of the Variables and Determining the Levels of Integration

The statistical methodology requires, before estimating the model, determining the integration levels of the time series used in the model under study. If these series are non-stationary at their levels, their use in estimation leads to the problem of spurious regression, which produces biased estimators. For this purpose, we rely on the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. A series is considered stationary if it is stationary according to both tests, following the Dickey-Fuller testing procedure.

To determine the lags required to correct for potential autocorrelation and heteroskedasticity of errors in the unit-root models of these tests, we rely on the optimal selection determined automatically by the software on the basis of the lowest Akaike criterion value. After conducting the ADF test, we record the calculated unit-root statistic and its associated probability, and summarize the results in the following table:

Table 4: Results of the Stationarity Test of the Variables According to the ADF Test

Variable	Level / First Difference	Model Type	Model (3): Calculated Statistic	Probability	Model (2): Calculated Statistic	Probability	Model (1): Calculated Statistic	Probability	Integration Level
LG	Level		/	/	-2.02	0.27	/	/	I(1)
LG	First difference		/	/	-4.16	0.00	/	/	
LGE	Level		/	/	-2.21	0.20	/	/	I(1)
LGE	First difference		/	/	-4.06	0.00	/	/	
LGT	Level		/	/	-2.20	0.20	/	/	I(1)
LGT	First difference		/	/	-3.87	0.00	/	/	
LOP	Level		/	/	/	/	0.87	0.89	I(1)
LOP	First difference		/	/	/	/	-5.12	0.00	

(3): Presence of both a trend and a constant; (2): Presence of a constant only; (1): No trend and no constant.

Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software (see Appendix 1).

The results of the ADF test for the stationarity of the variables confirm that all variables are non-stationary in levels, even at the 10% significance level, owing to the presence of a unit root, confirming that the source of non-stationarity is of the DS type. However, taking only the first difference enabled us to eliminate the unit roots in all variables, making them stationary at the first difference at the 1% significance level only.

Regarding the Phillips–Perron (PP) test, we record the calculated statistic and its associated probability in the following table.

Table 5: Results of the Stationarity Test of the Variables According to the PP Test

Variable	Level / First Difference	Model Type	Model (3): Calculated Statistic	Probability	Model (2): Calculated Statistic	Probability	Model (1): Calculated Statistic	Probability	Integration Level
LG	Level		/	/	-2.02	0.27	/	/	I(1)
LG	First difference		/	/	-4.12	0.00	/	/	
LGE	Level		/	/	-2.23	0.19	/	/	I(1)
LGE	First difference		/	/	-4.06	0.00	/	/	
LGT	Level		/	/	-1.30	0.61	/	/	I(1)
LGT	First difference		/	/	-4.88	0.00	/	/	
LOP	Level		/	/	/	/	0.99	0.91	I(1)
LOP	First difference		/	/	/	/	-5.11	0.00	

(3): Presence of both a trend and a constant; (2): Presence of a constant only; (1): No trend and no constant.

Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software (see Appendix 2).

Similarly, the results of the PP test confirm that all variables are non-stationary in levels, even at the 10% significance level, owing to the presence of a unit root. However, taking the first difference was sufficient to eliminate all unit roots at the 1% significance level only, thereby making the variables stationary at the first difference. Based on the results of the Dickey–Fuller (ADF) and Phillips–Perron (PP) tests, we can therefore consider all the series of the variables under study to be non-stationary in levels and stationary only at the first difference, which allows us to classify them as integrated of order one, I(1).

First: Determination of the Optimal Vector Autoregression Model

Before beginning the study of the dynamic behavior of the system's variables, we first select the appropriate model, including determining the optimal lag length and the validity of the model, because this type of model is highly sensitive to the lag length. Accordingly, based on the selection criteria available in the software used, VAR(4) was selected as the best model for all expenditure variables. The model was found to be stable because the inverses of all roots lie within the unit circle. It also does not suffer from residual autocorrelation or serial correlation up to the fifth order. In addition, the residuals are symmetrical and mesokurtic, that is, they have constant variance, making the parameter estimators minimum-variance estimators and therefore the best estimators. Consequently, they possess the property of efficiency, and the models were therefore accepted. (See Appendix 03.)

Second: Study of the Dynamic Behavior of the Variables

The study of dynamic behavior includes variance decomposition and the analysis of impulse response functions. In each case, we seek to determine the effect of oil prices on public expenditure in both its current and capital components.

Third: Variance Decomposition Analysis

The study of the dynamic behavior of the model variables initially requires ordering the variables within the recursive structure of the system, such that any variable is simultaneously affected only by the variables preceding it in the ordering. The results of the analysis are highly sensitive to this ordering. In this study, we assume that oil prices precede all expenditure variables in the ordering, meaning that oil prices are not simultaneously affected by any of the expenditure variables, whereas all expenditure variables are simultaneously affected by oil prices.

Variance decomposition expresses the proportion of the forecast error variance of one of the expenditure variables (G, GE, and GT) resulting from an unanticipated shock to the oil price variable (OP) over the forecast horizon. The results of the forecast error variance decomposition for the expenditure variables over five future years are summarized as follows:

Table 6: Results of Variance Decomposition Analysis

Period / Type of Expenditure	Public Expenditure G%	Current Expenditure GE%	Capital Expenditure GT%
First year	8.33	11.69	1.08
Second year	9.74	12.49	5.59
Third year	13.54	14.06	21.26
Fourth year	17.15	14.80	24.09
Fifth year	17.89	16.13	19.91

Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software.

An examination of the above table shows that in the first year, 8.33% of the forecast errors associated with changes in the growth rates of public expenditure (G) are attributable to errors in the oil price variable (OP). This proportion then begins to increase, reaching 17.89% in the fifth year. Oil prices also contribute 11% to explaining fluctuations in the forecast error variance of the current expenditure variable (GE) in the first year, and this proportion continues to increase slightly, reaching 16.13% after five periods, which is not far from the preceding figure. With regard to capital expenditure (GT), however, the contribution of oil prices in the first year is very low, at 1.08%, but it rises sharply in the third year to 21.26% and reaches 24.09% in the fourth year, before declining slightly in the fifth year and stabilizing at approximately 20%. Based on this analysis, we can state that the behavior of the expenditure variables, in both their current and capital components, follows fluctuations in oil prices. In other words, future expenditure values in Algeria are determined on the basis of oil prices. In the first year, current expenditure is more affected than capital expenditure, for which virtually no response is recorded. However, this changes after five periods, when capital expenditure becomes more affected than current expenditure.

Second Subsection: Study of Impulse Response Functions

Impulse response functions constitute another tool that enables us to study the dynamic behavior of the system's variables. These functions measure the response of the model variables to a shock occurring in one of the variables by an amount equal to one standard deviation of the structural error associated with that variable. In other words, within this framework, we examine the effect of a shock to the growth rate of oil prices, DLO, on the current and future values of the growth rates of the expenditure variables (DLG, DLGE, and DLGT).

Table 7: Impulse Response Results

Period / Type of Expenditure	Public Expenditure G%	Current Expenditure GE%	Capital Expenditure GT%
First year	4.99	5.73	2.31

Second year	2.63	2.85	4.86
Third year	3.99	2.69	1.01
Fourth year	3.98	1.73	4.99
Fifth year	1.84	2.95	1.62
Average increase	3.28	2.95	2.47

Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software.

According to Cholesky, the magnitude of the shock to oil price growth rates ranges between 2.6% and 2.7%. When this shock occurs, public expenditure responds with an increase of 4.99% in the first year. In the same year, the response is concentrated in current expenditure, with an increase of 5.73%, whereas the increase in capital expenditure is only 2.31%. The effect of this shock continues in the subsequent years. In the second year, capital expenditure records a noticeable increase of 4.86%, thereby exceeding current expenditure, whose growth rate declines to 2.85% and remains at the same level in the following year. Capital expenditure, however, records a sharp decline to 1.01% in the third year before rising again in the fourth year, with a growth rate of 4.99%. Overall, the average increase in public expenditure is 3.28%, compared with 2.95% for current expenditure and 2.47% for capital expenditure. In all cases, these figures exceed the magnitude of the increase in oil prices.

Overall, the above results indicate that government expenditure, in both its components, responds to shocks in oil price fluctuations. A positive shock to oil price fluctuations had a positive effect on the dependent variables [G, GE, GT]. Conversely, a negative shock to oil price fluctuations had a negative effect on these dependent variables. This is attributable to the strong relationship between government expenditure and public revenues, which depend heavily on petroleum taxation. In a country such as Algeria, which depends entirely on oil revenues, public expenditure policy is closely linked to fluctuations in oil prices. Thus, the response of fiscal policy to increases in oil prices takes the form of a substantial increase in public expenditure. Fiscal policy in Algeria is characterized by cyclical: public expenditure policy tends to be expansionary during periods of economic recovery as a result of increased revenues, and contractionary during periods of recession.

In the mid-1980s, following the decline in oil prices, the dynamics of expenditure changed. Public investment declined, as did government revenues, while the continued increase in consumption expenditure and the decline in Algerian government revenues led to an expansion of the fiscal deficit. This was accompanied by a tightening of fiscal policy during the period 1994–1998. However, the Algerian government subsequently returned to an expansionary fiscal policy following the increase in oil prices and adopted economic recovery programmes, growth-support programmes, and programmes aimed at achieving economic stability during the period 2001–2014. This led to an increase in the volume of public expenditure relative to the volume of government revenues, which depended primarily on petroleum taxation.

Third Section: Study of the Effect of Oil Price Fluctuations on the Components of Expenditure in the Long Run

Having presented a descriptive analysis of the study data and examined the effect in the short run, we now investigate the existence of a long-run relationship extending from oil prices to the expenditure variables. To this end, we rely on the bounds-testing methodology, which initially requires that the integration levels not exceed one. Application of this approach first requires determining the optimal lag length in the model and then applying the Bounds Test to the study variables. If a relationship is found, the long-run results are examined.

First Subsection: Results of Model Selection and Bounds Tests

To use the ARDL methodology, we first determine the lag length of the unrestricted error-correction model based on the Akaike Information Criterion (AIC), whereby the lag length yielding the lowest value of this criterion is selected. It should be noted that a constant term and no trend were accepted

in the models because the trend was not statistically significant. After determining the model, it was subjected to the bounds test, and the results are recorded as follows:

Table 8: Results of Model Selection and Bounds Tests

Type of Expenditure	Public Expenditure G	Current Expenditure GE	Capital Expenditure GT
ARDL model type	ARDL(5,5)	ARDL(3,2)	ARDL(5,0)
Calculated statistic of the Bounds Test	9.99	5.09	6.63
Upper bound at 5%	4.66	4.66	6.35
Lower bound at 5%	4.09	4.09	5.39

Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software (see Appendix 04).

The above results show that ARDL(5,5) was accepted as the best model for public expenditure, whereby five lags are taken for the dependent variable LG and the explanatory variable LOP. With regard to current expenditure, the ARDL(3,2) model was adopted as the best specification describing the behavior of this variable, with three lags for the dependent variable and two lags for the explanatory variable. As for capital expenditure, five lags of the dependent variable alone were sufficient; therefore, the best model is ARDL(5,0). When these models were subjected to the bounds test, all the calculated values of the bounds-test statistic were found to be greater than the upper bound. This enabled us to reject the null hypothesis and conclude that cointegration exists, that is, a long-run relationship extending from the explanatory variable, oil prices (OP), to the dependent variable represented by one of the expenditure variables.

First: Results of Model Validity Tests

Assessing the validity of econometric models is a necessary step for determining the extent to which the results are consistent with the basic assumptions of econometric models. This assessment concerns the residuals, particularly the absence of autocorrelation and the presence of constant variance, which are the two fundamental assumptions that must be satisfied for the model to be accepted, in addition to the normality of the residuals. The CUSUM and CUSUMSQ tests also represent another mechanism for verifying the stability of the parameters throughout the study period.

Table 9: Results of Model Validity Tests

Test / Type of Expenditure	Public Expenditure G	Current Expenditure GE	Capital Expenditure GT
Test for absence of autocorrelation*	12.83 (0.38)	8.52 (0.93)	9.39 (0.66)
Test for homoskedasticity*	4.49 (0.97)	19.96 (0.22)	2.73 (0.99)
Skewness	-0.22	-0.19	0.05
Kurtosis	2.89	2.83	4.25
Jarque-Bera normality test	0.25 (0.88)	0.21 (0.89)	1.85 (0.39)
Parameter stability according to CUSUM	Stable	Unstable	Stable
Parameter stability according to SQCUSUM	Stable	Stable	Unstable

Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software (see Appendix 04).

(.) represents the probability associated with testing the null hypothesis.

- The Ljung-Box test is used.

Based on the results obtained, we can state that there is no autocorrelation among the residuals up to lag $h = 16$, based on the probability associated with the Ljung-Box test statistic for the three models.

The use of the same test also led us to accept the hypothesis of constant residual variance. Only at this point can we state that the parameter estimators are unbiased and have minimum variance, that is, that they are BLUE and possess the property of efficiency. With regard to the properties of the normal distribution, the results show that the residuals are symmetrical (Skewness) and mesokurtic, since the value of Kurtosis is less than 3, the characteristic value of the normal distribution. This indicates the absence of outliers, except in the case of capital expenditure, for which this value was exceeded. Based on the probability associated with the Jarque-Bera test, we can accept the hypothesis of normality of the residuals of the three models. Using the CUSUM and CUSUMSQ tests, it was found that the parameters of the public expenditure model are stable according to both tests, whereas for the remaining models, at least one test confirms the same result. Accordingly, we can consider the parameters of all the models to be stable and consistent throughout the study period, and therefore accept all the models for analysis and study.

Second: Discussion of the Results of the Estimated Long-Run Relationship

Having confirmed the existence of a long-run cointegrating relationship extending from the oil price variable to the expenditure variables, and having also verified the validity of this relationship, we can now proceed to discuss the results of the relationship. The results of estimating this long-run relationship are presented in the following table:

Table 10: Results of the Estimates of the Long-Run Relationship

Type of Expenditure	Public Expenditure G	Current Expenditure GE	Capital Expenditure GT
Error-correction coefficient	-0.23 (0.00)	-0.10 (0.01)	-0.20 (0.00)
Speed of adjustment	23%	10%	20%
Time required to correct errors	4 years	10 years	5 years
Elasticity	1.11 (0.00)	1.04 (0.01)	1.32 (0.00)
Constant term	4.18 (0.00)	4.47 (0.02)	0.48 (0.03)
Adjusted R ²	98.89%	98.61%	97.91%

Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software (see Appendix 04).

(.) represents the probability associated with testing the null hypothesis of significance.

We observe that the error-correction coefficient for the three equations has a negative sign and is statistically significant at the 1% level. This once again confirms the acceptance of the long-run relationship. Based on the estimated values of the error-correction coefficient, the speed of adjustment is 23%, 10%, and 20% for public expenditure, current expenditure, and capital expenditure, respectively. In other words, when short-run shocks shift the model away from its equilibrium position, such as an oil price shock affecting expenditure through an increase or decrease, the cointegration mechanism allows short-run errors to be corrected in order to return to the long-run equilibrium position. Thus, 23%, 10%, and 20% of the gap are eliminated each year for public expenditure, current expenditure, and capital expenditure, respectively. Consequently, eliminating the entire gap and correcting the entire error requires 4, 10, and 5 years, respectively. These results indicate that the speed of adjustment for capital expenditure is greater than that for current expenditure. Therefore, the time required for correction in current expenditure is greater than that required for capital expenditure.

Based on the adjusted coefficient of determination, we can state that approximately 98% of the variations occurring in expenditure across its components are explained by the model, that is, they are determined on the basis of fluctuations in oil prices. This once again confirms that the behavior of expenditure in Algeria during the study period follows the behavior of oil prices. With regard to the elasticity of expenditure with respect to oil prices, it is statistically significant at the 1% level, with

values of 1.11, 1.04, and 1.32 for public expenditure, current expenditure, and capital expenditure, respectively. These values indicate that a 1% increase in oil prices leads to increases of 1.11%, 1.04%, and 1.32% in public expenditure, current expenditure, and capital expenditure, respectively. This means that the magnitude of the increase in expenditure, particularly capital expenditure, exceeds the magnitude of the increase in oil prices. In other words, in the opposite case, namely, when oil prices decline, current expenditure decreases, but by a smaller amount than capital expenditure.

Third Axis: Study of the Effect of Expenditure on Economic Equilibrium Indicators in Algeria (1986–2018)

The theoretical section established that public expenditure is one of the instruments of fiscal policy used by the state to achieve its macroeconomic objectives. It is also the means through which the government implements its economic and social programmes and exercises its role as an intervening actor in various economic activities. The importance of public expenditure has increased with the expansion of the social needs that it addresses, to the extent that it has acquired clear effects on the course of life within the state and implications for macroeconomic variables, namely growth, employment, inflation, and balance of payments equilibrium.

Public expenditure largely reflects the effectiveness of government and the extent of its influence on economic activity and the development of the state. Public expenditure has expanded in volume as the role of the state has evolved from the night-watchman state to the interventionist state and then to the productive state. This resulted from several factors, the most important of which is the expansion of the scope of public expenditure, as it has come to constitute a significant proportion of national income. Such expenditure is no longer limited to managing the traditional functions of the state; rather, it has become an instrument of economic policy through the control of purchasing power, income redistribution, and, ultimately, the level of employment and national income.

In the same vein, Keynes clarified the issue by asserting that public expenditure, as a fundamental instrument of economic policy, is the optimal instrument available to the state for achieving the objectives established within the framework of fiscal policy. Economists emphasize the necessity of respecting the objective of each expenditure undertaken during the implementation of fiscal policy, which increases the effectiveness of the accompanying measures. This makes public expenditure an economic policy with objectives aimed at regulating aggregate economic activity. Accordingly, in this section, we attempt to address the principal quantitative effects produced by public expenditure policy on the ultimate objectives of economic policy.

First Section: Descriptive Analytical Study of the Model Variables Using Principal Component Analysis (PCA)

Following the same approach as above, before subjecting the data to econometric analysis, we first introduce the data of the study sample by identifying the equilibrium variables and the sources of the data. We then apply the Principal Component Analysis method to the database in order to obtain a descriptive analytical overview of the study data.

1. Determination of the Study Sample

In order to answer the central question of this study, namely: What direction did the study identify for public expenditure policy in the Algerian economy? In other words, we attempt to establish a multidimensional relationship between oil price fluctuations and the macroeconomic variables of the national economy represented by the four components of the economic policy square, with public expenditure serving as an independent mediating variable in relation to the dependent variables represented by “growth, inflation, employment, and external equilibrium.” Therefore, we compiled the necessary data available for the period 1986–2018 and, using the necessary statistical tests and the EViews 10 software, summarized the study variables in the following table:

Table 11: Descriptive Characteristics of the Study Variables

Series	Code	Description	Source
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Public expenditure	GP	Annual values as a percentage of GDP	World Bank, “statistics on the website”; Ministry of Finance, “annual statistical reports”; National Office of Statistics of Algeria, “website”; Bank of Algeria, “Governor’s reports”
External balance of goods and services	EBGS		
Unemployment rates	CH		
Inflation rates	INF		
GDP growth rate	GPIB		

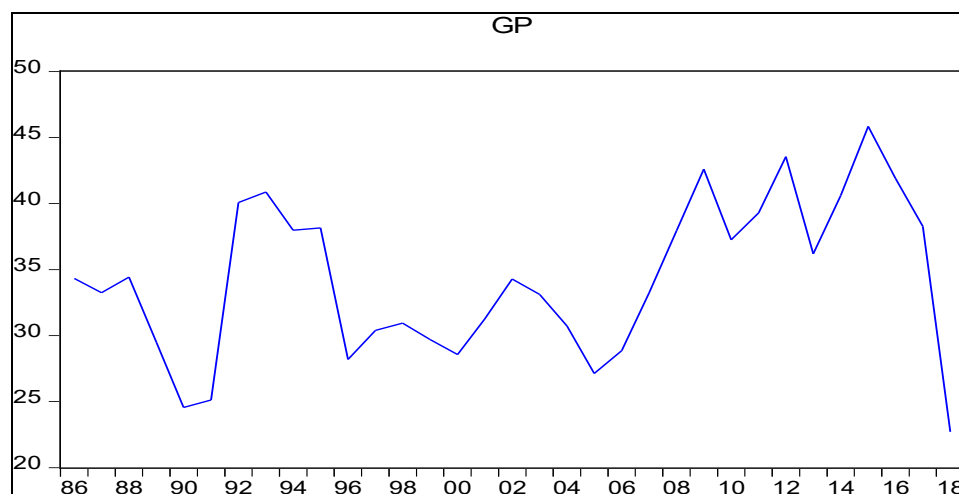
Source: Prepared by the researcher.

1.1 Public Expenditure as a Percentage of GDP

When discussing public expenditure, attention must be given to the macroeconomic effects that may result from this financial outlay by the state. Accordingly, the level of reliance on such an expenditure policy should be increased without neglecting other aspects of economic policy, such as monetary and fiscal policy. In order to align with the theoretical aspect and complete the second part of the econometric study, we adopted public expenditure as a proportion of GDP as an independent variable, assigning it the symbol (GP). As for the statistics, they were obtained from databases compiled from:

- Reports of the Governors of the Bank of Algeria for the years 2010–2018, available on the website of the Ministry of Finance;
- Annual Finance Laws available on the website of the National Office of Statistics (ONS);
- The World Bank database available on its website.

Figure 7: Evolution of Public Expenditure in Algeria (1986–2018)
Unit: Percentage of GDP



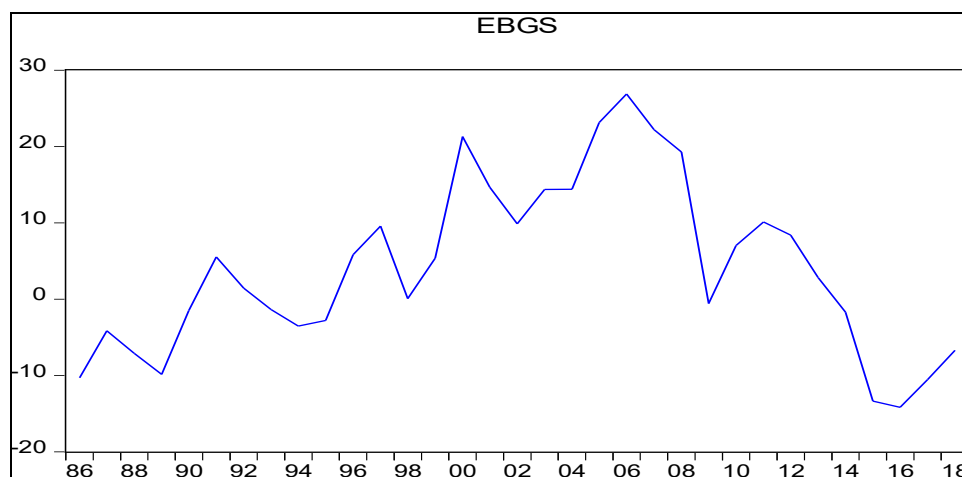
Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software

The figure shows the changes in the ratio of public expenditure to GDP. The curve clearly indicates that this ratio was not stable throughout the period under study. The values declined from 34.33% in 1986 to 25.11% in 1991, which coincided with the 1986 oil price shock. At the beginning of the 1990s, the ratio experienced a temporary increase, exceeding 40%, before declining again during the period 1996–2006, with an average ratio of 29.7%. This was followed by a noticeable increase in the expenditure-to-GDP ratio, which reached 42.6% in 2009, despite the global financial crisis, which affected GDP without reducing public expenditure. The ratio then followed a cyclical downward and

upward path, reaching its maximum value of 45.8% in 2015. These successive declines can be attributed to the recovery policy adopted by the state following the oil price shock of 2014.

2.1. External Balance of Goods and Services

The external balance of goods and services (formerly referred to as the resource balance) is equal to exports of goods and services minus imports of goods and services. According to the World Bank, which is the source of the series data, this indicator is expressed as a percentage of GDP and is denoted by (EBGS).



Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software

What can be inferred from the figure is the non-monotonic nature of the curve and its short-term fluctuations between increases and decreases, indicating the instability of Algeria's external trade relations, which are dominated by crude oil, accounting for more than 96%. This means that the trade balance is almost perfectly correlated with oil prices. Before the 1990s, the trade balance recorded substantial deficits ranging between [-1% and -10%], owing to the difficult economic conditions prevailing during that period as a result of the sharp deterioration in oil prices. The situation did not improve significantly at the beginning of the 1990s; however, conditions began to improve, particularly in 1997, when the ratio reached 9.5%. This improvement was renewed with the beginning of the third millennium as a result of rising oil prices. The trade balance continued to improve relative to GDP, reaching its maximum value in 2006 at 26.9%. It was then affected by the 2008 global financial crisis, as reflected in a sharp decline in the external balance to -0.58. The balance improved during the following few years, but subsequently deteriorated again to -1.7% as a result of the 2014 oil price crisis, continuing to record negative values that reached a minimum of -14.18% as a percentage of GDP.

3.1. Unemployment Rates

Among economists, unemployment is defined as “an increase in the supply of human labour or persons seeking employment beyond the demand determined by the labour market” (Al-Azzawi, 2011). According to the International Labour Office (1953), the category of unemployed persons consists of all individuals aged between 16 and 59 who, on a given day, fall into one of the following categories:

- **Without work:** that is, those who are not working for remuneration;
- **Available for work:** that is, those who are able to undertake work immediately;
- **Seeking work:** that is, those who have taken specific steps during a given period to seek paid employment.

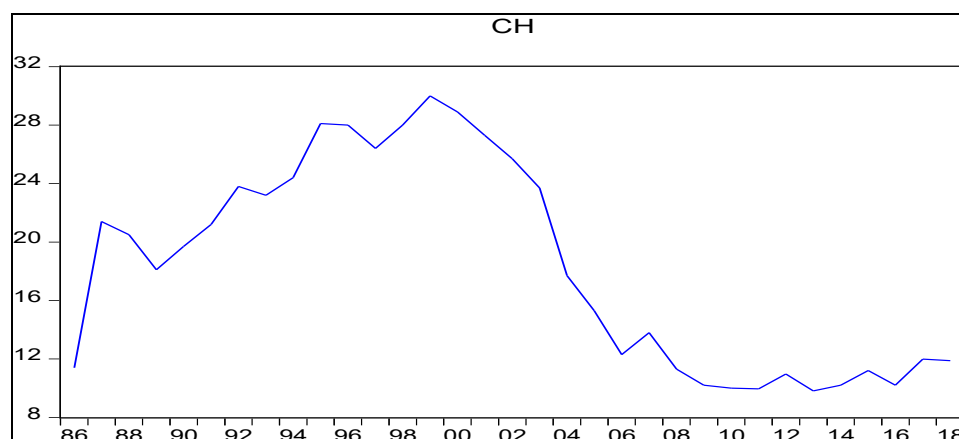
With reference to the main definitions related to unemployment, the National Economic and Social Council defined an unemployed person as an individual who meets the following criteria (Talbi & El-Gueri, 2011):

- Being without work;
- Being present and qualified for work;
- Having made several attempts to find employment.

This represents the official standardized definition. As for its symbol in the econometric study, it will be **CH**, and its data will be extracted from databases obtained from:

- National Office of Statistics (ONS);
- World Bank database.

Figure 9: Evolution of Unemployment Rates in Algeria (1986–2018)
Unit: (%)



Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software

A first examination of the study period reveals a sharp increase in unemployment rates beginning in 1986, when the rate rose from 11% to 21%. The rates then declined until 1990 before rising again, reaching their highest level in 1999, at an unemployment rate of 30%. With the financial recovery experienced by Algeria at the beginning of the new millennium, the adoption of an expansionary policy, and the implementation of ambitious development programmes within the national economy, unemployment rates began to decline in line with the improvement in economic conditions and the rise in oil prices. The rate subsequently stabilized relatively, averaging approximately 11% for the remainder of the study period.

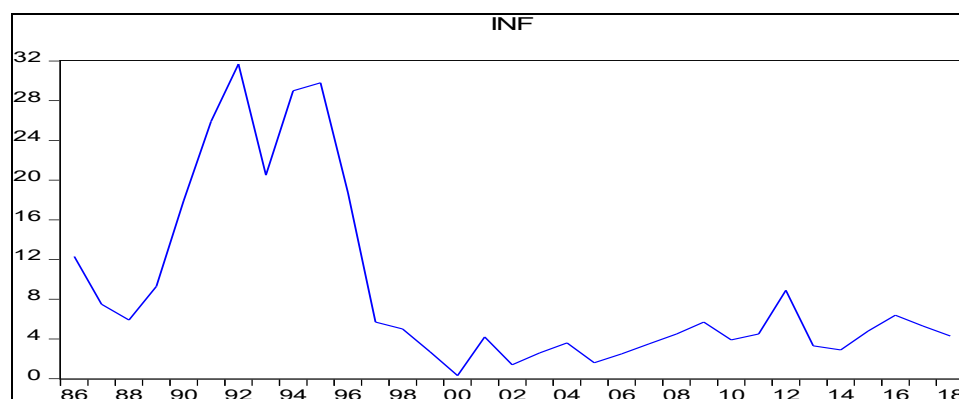
4.1. Inflation Rates

Inflation is perhaps one of the most widely used and commonly encountered economic terms. Nevertheless, economists have not reached a consensus on its definition, as the concept encompasses several economic manifestations, such as excessive increases in consumer prices. It may also be viewed in terms of an increase in the money supply and excessive issuance of currency, an increase in costs, and so forth. However, we will limit ourselves to the generally accepted conception of inflation as “a sustained increase in the general price level, representing a continuous upward movement in prices, whether this increase results from an increase in the quantity of money that causes the monetary flow to exceed the flow of goods, from rising production costs, or from the existence of excess aggregate demand, in addition to the reinforcing role of inflationary expectations” (Khalaf, 2006, p. 172).

The following symbol, **INF**, is adopted for this dependent variable, and its data will be extracted from databases obtained from:

- National Office of Statistics (ONS);
- World Bank database.

Figure 10: Evolution of Inflation Rates in Algeria (1986–2018)
Unit: (%)



Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software

The figure reveals three major stages in the development of inflation rates in the Algerian economy:

- [1986–1989]: A decline in inflation rates from 12.3% to 5.9%.
- [1989–1995]: Record increases in inflation rates, reaching 31.7% and 29.8% in 1992 and 1995, respectively.
- [1997–2018]: This period witnessed relatively controlled inflation rates, ranging between 0.3% and 8.9%, recorded in 2000 and 2012, respectively.

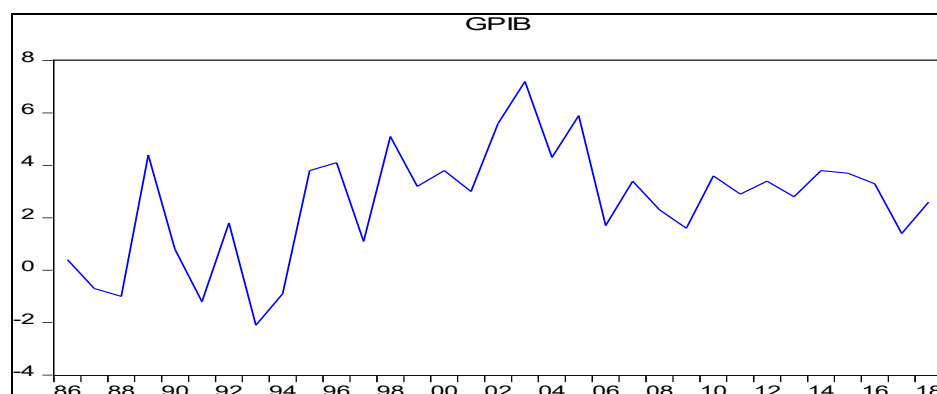
It is also noteworthy that the figure shows no apparent effect of oil price shocks on the inflation-rate curve, which leads us to believe that the Algerian economy has remained relatively insulated from imported inflation originating abroad.

5.1. Gross Domestic Product Growth

There is no doubt that economic growth represents a reflection of the economic activity of any country and the extent of its development. It has long been a consistent indicator in every statistical and evaluative report on any economy. Economic growth inspired numerous economic theorists, foremost among them Robert Malthus in 1798 in his work *An Essay on the Principle of Population*, and was subsequently addressed by numerous researchers and economists. Consequently, definitions have varied and become increasingly diverse. Among them is Philippe Perroux's definition: economic growth is "the increase recorded over a period of time, usually one year or successive periods of time, in an expansive economic variable, namely real net output" (Mustafa & Ahmed, 1999, p. 39). It is also defined as "the annual increase recorded as a percentage of real domestic output" (Bin Qana, 2012, p. 10). Most definitions of growth revolve around an increase in aggregate economic variables, such as national output or national income, as well as the share of these aggregates accruing to individuals. In general, economic growth is "the occurrence of a sustained increase in gross domestic product or gross national product, resulting in an increase in the average individual's share of real national income" (Ajamiya et al., 2007, p. 73).

The symbol **GPIB** is adopted for this dependent variable, and its data are obtained from the databases of the National Office of Statistics (ONS) and the World Bank.

Figure 11: Evolution of Economic Growth Rates in Algeria (1986–2018)
Unit: (%)



Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software

The figure shows fluctuations in economic growth rates, both positive and negative, over short periods, indicating, on the one hand, the instability of the Algerian economy and, on the other, the dependence of GDP on oil prices, as evidenced by its response to oil price shocks, which coincided with declines in the country's economic growth rate. Growth declined from 1986 to -0.7, then improved during the 1990s as oil prices recovered, despite reaching its lowest rate in 1993 at -2.1. With the beginning of the third millennium, the Algerian economy recorded its highest growth rate in 2003, when economic growth exceeded 7.2. However, it was affected by the global financial crisis and declined to 1.6 in 2009 and 1.7 in 2017 as a result of the decline in oil prices in 2014.

1. Bartlett Test of the Effectiveness of Factor Analysis

This test is based on the null hypothesis that the correlation matrix is an identity matrix. If this hypothesis is accepted, the PCA method cannot be applied and the axes cannot be reduced because there is no relationship among the study variables. The statistic calculated for this test follows a chi-square distribution. The result of this test is presented in the following table:

Table 12: Result of Bartlett's Test

Statistic	Value
Chi-square (Observed value)	26.8781
Chi-square (Critical value)	18.3070
Degrees of freedom (df)	10
p-value	0.0027
Alpha	0.05

Source: Prepared by the researcher based on the outputs of the XLSTAT 2016 statistical software.

Based on the p-value associated with the calculated statistic, the null hypothesis can be rejected, indicating that the correlation matrix differs from the identity matrix. Therefore, there are sufficient correlations among the study variables to apply PCA and reduce the number of axes.

2. Means and Standard Deviations of the Variables

Table 13: Descriptive Characteristics of the Study Variables

Variables	Minimum	Maximum	Average	Standard deviation	Coefficient of variation
GPIB	-2.10	7.20	2.58	2.18	0.84
INF	0.30	31.70	8.97	9.00	1.00
CH	9.82	30.00	18.38	7.15	0.39
GP	22.71	45.84	34.27	5.91	0.17
EBGS	-14.18	26.89	4.08	11.19	2.75

Source: Prepared by the researcher based on the outputs of the XLSTAT 2016 statistical software.

The table provides descriptive statistics for the study variables, as follows:

- **GDP growth (GPIB):** Its maximum value was 7.2 in 2013, while its minimum value was -2.1 in 1993. The series had an arithmetic mean of 2.58 during the study period, with a standard deviation of 2.18.
- **Inflation rate (INF):** Inflation rates covered a wider range, with the highest and lowest values falling within the range [0.3; 31.7], recorded in 1992 and 2000, respectively. The arithmetic mean was 8.97, while the values deviated from their mean by 9.
- **Unemployment rates (CH):** The highest unemployment rate recorded in Algeria during the study period was 30% in 1999, whereas the lowest was 9.82%. The average unemployment rate was 18.38%, with a standard deviation of 7.15%.
- **External balance of goods and services (EBGS):** The trade balance experienced clear fluctuations during the study period, with values ranging from [-14.18; 26.89], recorded in 2016 and 2006, respectively. The average was 4.08, with a standard deviation of 11.19.
- **Public expenditure-to-GDP ratio (GP):** The highest value of the independent variable was 45.84% in 2015, while the lowest was 22.71% in 2018. The arithmetic mean of this series was 34.27%, with a standard deviation of 5.91%.

It should be noted that the coefficients of variation of the time series for the variables under study were as follows: 0.84, 1, 0.39, 0.17, and 2.75 for GPIB, INF, CH, GP, and EBGS, respectively. This coefficient indicates the relative stability of the series, with the series having the lowest coefficient being the most stable, followed by those with progressively higher coefficients.

3. Correlation Matrix

Table 14: Correlation Matrix

Variables	GPIB	INF	CH	GP	EBGS
GPIB	1	-0.47	0.02	-0.07	0.33
INF	-0.47	1	0.34	0.08	-0.32
CH	0.02	0.34	1	-0.38	0.13
GP	-0.07	0.08	-0.38	1	-0.33
EBGS	0.33	-0.32	0.13	-0.33	1

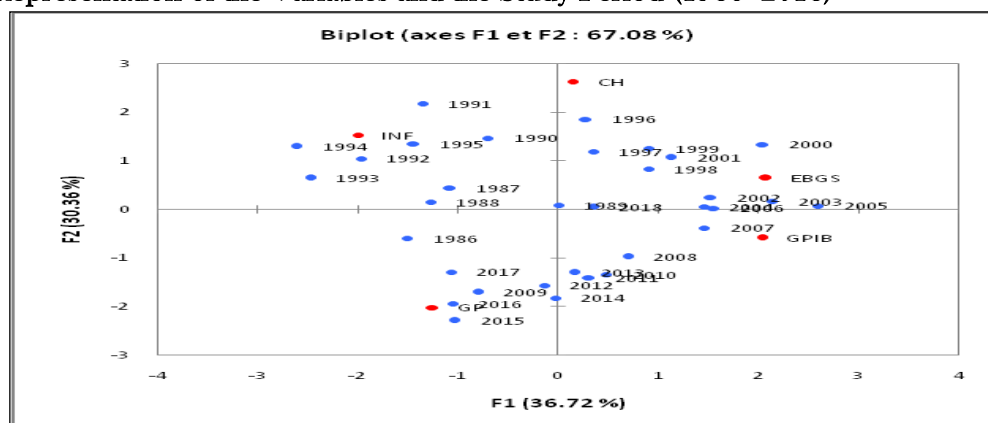
Values in bold are significantly different from zero at a significance level of $\alpha = 0.05$.

Source: Prepared by the researcher based on the outputs of the XLSTAT 2016 statistical software.

Considering the public expenditure-to-GDP ratio (GP) as the independent variable with respect to the following dependent variables: GDP growth rates (GPIB), inflation rates (INF), unemployment rates (CH), and EBGS, representing the external balance through the ratio of the trade balance to GDP, the correlation matrix provides a preliminary indication of the weak relationship between the independent variable under consideration and the other dependent variables. For example, the correlation coefficient between GP and GPIB is -0.07, which is close to zero and indicates a weak linear correlation between the two variables. The negative sign also indicates an inverse relationship between them. Similarly, the linear relationship between GP and INF is characterized by a correlation coefficient of 0.08. As for the two dependent variables CH and EBGS, their correlations with the independent variable GP are somewhat stronger, at -0.33 and -0.38, respectively; however, these linear relationships are inverse in nature. Initially, the weak linear correlations between the variables, which are almost nonexistent in some cases, can be explained by the possibility that the time series of these dependent variables are non-stationary.

4. Graphical Representation of the Variables During the Study Period

As shown in the figure below, the first axis explains 36.72% of the information contained in the original data table, while the second axis explains approximately 30.36% of the information contained in the original data table. Accordingly, the first plane explains 67% of the information contained in the original data table, which is a reasonably acceptable proportion for analysis and study. The inertia of the original data table is 67%, which is also considered reasonable.

Figure 12: Graphical Representation of the Variables and the Study Period (1986–2018)

Source: Prepared by the researcher based on the outputs of the XLSTAT 2016 statistical software

The graphical representation of the variables shows that all variables are acceptable for the analysis and study because of their distance from the origin. Moreover, given the considerable distance between the public expenditure variable (GP) and the dependent variables, we can confirm the existence of an inverse relationship between the public expenditure-to-GDP ratio and growth, unemployment, and inflation rates in Algeria, in addition to the trade balance variable, during the study period. This was also confirmed by the correlation matrix analysis. Regarding the relationship between the variables and the axes, EBGs, CH, and GPIB have positive correlations with the first component, whereas INF and GP have negative correlations.

An examination of the previous figure shows that, at the beginning of the study period (1986–1995), represented on the first axis by negative values, Algeria experienced a severe economic recession characterized by declining macroeconomic indicators and a reduction in the volume of public expenditure. The balance indicators gradually improved during the period (1996–2014), in line with the improvement in rent-based financial resources and the Algerian economy's entry into an expansionary phase of expenditure in both its investment and current components through medium-term planning policies and programmes for economic recovery and growth support. This period also involved absorbing the financial shock that affected the global real-estate market in 2008 and 2009. Thereafter, the economy entered another period of recession characterized by an expenditure-austerity policy, following the decline in oil prices in international markets during 2015–2017.

Second Section: Econometric Study of the Effect of Public Expenditure on Balance Indicators in Algeria (1986–2018)

This part of the study is concerned with the econometric measurement of the effect of public expenditure policy on balance indicators in Algeria during the period 1986–2018 and with highlighting the correlational and causal relationships among the study variables. Accordingly, we will assess the rationality of the country's expenditure policy in terms of its effectiveness in achieving the objectives of economic policy in Algeria within what is known as Kaldor's famous magic square. This constitutes the intended rationale and is considered a decisive factor in the success of the expenditure policy orientation of any economy.

1. Study of the Stationarity of the Variables and Determination of Their Levels of Integration

Following the same methodology adopted previously, we first examine the stationarity of the balance indicators and determine their levels of integration. After conducting the Augmented Dickey-Fuller (ADF) test, we record the calculated unit-root statistic and its associated probability, and summarize the results in the following table:

Table 15: Results of the ADF Stationarity Test for the Balance Variables

Variable	Level/First difference	Model (3): Calculated	p-value	Model (2): Calculated	p-value	Model (1): Calculated	p-value	Integration level
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		statistic		statistic		statistic		
GP	Level	/	/	-2.15	0.13	/	/	I(1)
	First difference	/	/	/	/	-4.36	0.00	
EBGS	Level	/	/	/	/	-1.78	0.07	I(0)
CH	Level	-2.99	0.15	/	/	/	/	I(1)
	First difference	/	/	/	/	-6.56	0.00	
INF	Level	-2.45	0.34	/	/	/	/	I(1)
	First difference	/	/	/	/	-2.82	0.00	
GPIB	Level	/	/	-3.67	0.00	/	/	I(0)

(3): Presence of a general trend and a constant; (2): Presence of a constant only; (1): No general trend and no constant.

Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software (see Appendix 5).

The results of the ADF stationarity test confirm that the trade balance variable is stationary in levels at the 8% significance level, while the GDP growth rate is also stationary in levels, but only at the 1% significance level. The variables representing public expenditure, unemployment rates, and inflation are non-stationary in levels, even at the 10% significance level, owing to the presence of a unit root. However, using the first difference alone made it possible to eliminate the unit roots in all the variables, which became stationary at the first difference at the 1% significance level. With regard to the Phillips-Perron (PP) test, the calculated statistic and its associated probability are reported in the following table.

Table 16: Results of the PP Stationarity Test for the Balance Variables

Variable	Level/First difference	Model (3): Calculated statistic	p-value	Model (2): Calculated statistic	p-value	Model (1): Calculated statistic	p-value	Integration level
GP	Level	/	/	-2.52	0.11	/	/	I(1)
	First difference	/	/	/	/	-3.93	0.00	
EBGS	Level	/	/	/	/	-1.77	0.07	I(0)
CH	Level	-2.93	0.16	/	/	/	/	I(1)
	First difference	/	/	/	/	-6.20	0.00	
INF	Level	/	/	/	/	-1.37	0.15	I(1)
	First difference	/	/	/	/	-4.90	0.00	
GPIB	Level	/	/	-3.73	0.00	/	/	I(0)

(3): Presence of a general trend and a constant; (2): Presence of a constant only; (1): No general trend and no constant.

Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software (see Appendix 6).

Similarly, the results of the PP test confirmed that the trade balance variable is stationary in levels at the 8% significance level, while the GDP growth rate is also stationary in levels, but only at the 1% significance level. The variables representing public expenditure, unemployment rates, and inflation are non-stationary in levels, even at the 10% significance level, owing to the presence of unit roots.

However, using the first difference alone made it possible to eliminate the unit roots in all the variables, which became stationary at the first difference at the 1% significance level.

Based on the results of the Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, we can consider all the time series of the study variables to be a mixture of integration levels $I(0)$ and $I(1)$. Accordingly, we adopt the bounds methodology to examine and test the relationship between public expenditure and the balance indicators in Algeria during the study period. Applying this approach initially requires determining the optimal lag length in the model, followed by applying the Bounds test to the study variables. If a relationship exists, the long-run results are then examined.

2. Results of Model Selection and Bounds Tests

To estimate the ARDL model, we first determine the optimal lag length of the unrestricted error-correction model based on the Akaike Information Criterion (AIC), whereby the lag length that produces the lowest value of this criterion is selected. A constant and a general trend were accepted in the unemployment equation only, whereas in the remaining models, the presence of a general trend was not accepted because it was not statistically significant. After determining the models, they were subjected to the Bounds test. The results are presented in the following table:

Table 17: Results of Model Selection and Bounds Tests

Indicator type	Trade balance EBGS	Unemployment rates CH	Inflation rates INF	GDP growth rate GPIB
ARDL model type	ARDL(5,6)	ARDL(7,2)	ARDL(5,6)	ARDL(1,3)
Calculated Bounds-test statistic	11.07	5.39	5.80	8.84
Upper bound at 5%	6.35	5.15	4.11	4.11
Lower bound at 5%	5.39	4.68	3.15	3.15

Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software (see Appendix 07).

Based on the preceding table, ARDL(5,6) was selected as the best model for the trade balance, with five lags for the dependent variable EBGS and six lags for the explanatory variable GP. For unemployment rates, the ARDL(7,2) model was adopted as the best model, with seven lags for the dependent variable and two lags for the explanatory variable. Regarding inflation rates, five lags were included for the dependent variable and six lags for the GP variable; consequently, the best model was ARDL(5,6). Finally, the most appropriate model for the growth rate was ARDL(1,3). When these models were subjected to the Bounds test, all the calculated values of the Bounds-test statistic were found to be greater than the upper bound, which made it possible to reject the null hypothesis and conclude that cointegration exists, that is, a long-run relationship extending from the explanatory variable, namely the expenditure share of GDP, toward the dependent variable represented by one of the economic balance indicators.

1. Results of the Model Validity Tests

This step is necessary to ensure the validity of the models. Following the same methodology used previously, the results of the tests are presented in the following table:

Table 18: Results of the Model Validity Tests

Test / Indicator type	Trade balance EBGS	Unemployment rates CH	Inflation rates INF	GDP growth rate GPIB
Test for absence of serial correlation				
Breusch-Godfrey Serial Correlation LM	0.77 (0.67)	2.12 (0.34)	8.54 (0.01)	2.69 (0.25)
Heteroscedasticity test				

Breusch-Pagan-Godfrey	8.00 (0.78)	12.27 (0.34)	10.87 (0.53)	6.31 (0.27)
Skewness	-0.76	0.80	0.39	-0.29
Kurtosis	4.81	3.74	2.54	3.24
Jarque-Bera normality test	6.35 (0.04)	3.41 (0.18)	0.94 (0.62)	0.50 (0.77)
Parameter stability according to CUSUM	Stable	Stable	Stable	Unstable
Parameter stability according to SQCUSUM	Stable	Stable	Stable	Unstable

Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software (see Appendix 07).

(.) represents the probability associated with the test of the null hypothesis.

Based on the Breusch-Godfrey test, we can state that there is no serial autocorrelation among the residuals up to lag $h = 2$ at the 5% significance level for all models except the inflation model, which shows the presence of serial autocorrelation. Regarding variance stability, the Breusch-Pagan-Godfrey test confirms the null hypothesis at the 5% significance level and indicates homoscedasticity of the residuals for all the models.

With regard to the characteristics of the normal distribution, the results show that the residuals are symmetric (Skewness) and flattened, since the value of Kurtosis is below the value of 3 characteristic of the normal distribution, indicating the absence of outliers, except for the residuals of the trade-balance equation, for which this value exceeds 3. Based on the p-value associated with the Jarque-Bera test, the hypothesis of normal distribution of the residuals can be accepted for only three of the models. Using the CUSUM and CUSUMSQ tests, it was found that the parameters of the first three models are stable according to both tests. Therefore, the parameters of these models can be considered stable and consistent throughout the study period, whereas the parameters of the growth equation are unstable.

2. Discussion of the Estimated Long-Run Relationship

After confirming the existence of a long-run cointegrating relationship extending from the oil price variable toward the expenditure variables, and after verifying the validity of the relationship, we can now proceed to discuss the results of this relationship. The estimates of this relationship are presented in the following table:

Table 19: Results of the Long-Run Relationship Estimates

Indicator type	Trade balance EBGS	Unemployment rates CH	Inflation rates INF	GDP growth rate GPIB
Error correction coefficient	-0.31 (0.04)	-0.66 (0.00)	-0.26 (0.00)	-0.71 (0.00)
Speed of adjustment	31%	66%	26%	71%
Time required to correct errors	3 years	1.5 years	3.85 years	1.4 years
Estimated value of the effect of expenditure	-7.16 (0.03)	-0.69 (0.00)	0.20 (0.02)	0.08 (0.00)
Estimated time coefficient	/	-0.45 (0.00)	/	/
Adjusted coefficient of determination R^2 -Adj	80%	96%	87%	3.6%

Source: Prepared by the researcher based on the outputs of the EViews 10 statistical software (see Appendix 07).

(.) represents the p-value associated with the test of the null hypothesis of significance.

Commenting on the table, we observe that the error correction coefficient for the four equations has a negative sign and a statistically significant and non-negligible value at the 1% significance level. This once again confirms the existence of a long-run relationship. Based on the estimated values of the

error correction coefficient, the speeds of adjustment are 31%, 66%, 26%, and 71% for the trade balance, unemployment, inflation, and GDP growth, respectively. In other words, when short-run shocks displace the model from its equilibrium position, such as a shock in oil prices that affects expenditure through an increase or decrease, the cointegration mechanism allows short-run errors to be corrected in order to return to the long-run equilibrium position. Thus, 31%, 66%, 26%, and 71% of the gap are eliminated each year for the trade balance, unemployment, inflation, and GDP growth, respectively. Consequently, correction requires 3, 1.5, 3.85, and 1.4 years, respectively. These results indicate that the speed of adjustment in unemployment rates and real GDP growth is greater than that in the trade-balance ratio and inflation rates, with the adjustment taking approximately half the time.

On the other hand, by examining the adjusted coefficient of determination, we can state that approximately 80% of the changes in the trade-balance ratio are explained by the model, 96% of the changes in unemployment rates are explained by the model, and 87% of the changes in inflation rates are likewise explained within the model, whereas only 3.6% of the changes in GDP growth are explained by the model. This means that these dependent variables, with the exception of GDP, are determined on the basis of changes in public expenditure in Algeria. This once again confirms that the behavior of public expenditure as an independent variable is behaviorally associated with the dependent variables, namely the trade balance, inflation rates, and unemployment rates, during the study period, and follows the behavior of oil prices.

Regarding the estimated elasticities of the dependent variables “EBGS/CH/INF/GPIB” with respect to the independent variable “GP,” they are statistically acceptable at the 1% significance level. Their values are -7.16, -0.69, 0.2, and 0.08 for the trade balance, unemployment, inflation, and GDP growth, respectively. These values indicate that a 1% increase in public expenditure leads to a decrease of 7.16% and 0.69% in the trade balance and unemployment, respectively, while an increase of 0.2% and 0.08% is observed in inflation rates and economic growth rates in Algeria during the study period.

This means that the magnitude of the change in the trade-balance ratio is greater than the change imposed on public expenditure, but in an inverse proportion. The same applies to changes in unemployment rates, although the effect of expenditure in absolute terms is greater. As for the change in inflation rates, it is five times smaller than the change in the public expenditure ratio, while the effect becomes even smaller in the relationship between public expenditure and real GDP growth.

Thus, the analysis of the models used to explain and interpret the relationship between public expenditure and the aggregate objectives of any economy does not show a marked effect on the aggregate balance indicators of the Algerian economy. This weak effect can be attributed to the predominantly consumption-oriented nature of the components of public expenditure compared with other forms of expenditure. Allocating a large proportion of GDP to expenditures of a final consumption nature, without being matched by effective productive activity, inevitably has a negative effect on the factors underlying the stability of the national economy. This is, of course, attributable to the lack of effectiveness of this type of expenditure, at least at present. Consequently, expanding it without justification at the expense of other forms of expenditure is detrimental to macroeconomic balances. It would be more appropriate to introduce qualitative improvements in expenditure areas rather than simply increasing expenditure quantitatively, because the effect would be twofold: on the one hand, it would affect the balanced sectoral allocation of expenditure, particularly toward other non-consumption expenditure areas; on the other hand, it would incorporate the Keynesian theory concerning the activation of aggregate demand.

Conclusion

In Algeria, government expenditure policy, as an important component of fiscal policy instruments, has experienced continuous growth, particularly since the beginning of 2001, with the implementation of substantial public investments following extensive expenditure programmes over relatively short

periods. This development was driven by the successive increases in oil prices during this period and by the authorities' intention at the time to increase the pace of public and private investment in order to take advantage of this financial opportunity and purchase social peace resulting from the prevailing political pressure. Accordingly, government expenditure can be considered a decisive variable in Algeria's economic and social life during the third millennium.

Therefore, the study presented in this research paper essentially focused on measuring and analyzing the extent to which fluctuations in oil prices affect government expenditure policy as an intermediary variable for final aggregate variables that are generally considered to ensure, to some extent, economic stability in Algeria, represented by the components of Kaldor's well-known quadrilateral.

The empirical results of the study, in its two dimensions adopted as a methodology for demonstrating this effect, showed the following:

First: The strong relationship between oil price fluctuations and public expenditure in Algeria during the study period. Rent-based financial revenue represents the dominant source of state revenues and the main source of financing for the national economy. This classifies Algeria as a quintessential rentier state and makes it vulnerable to the oil price shocks examined over both the short and long terms.

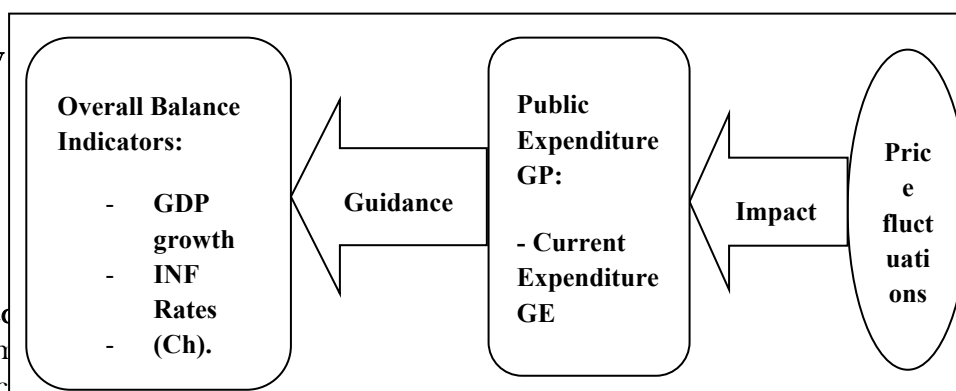
Second: The weak relationship between public expenditure and the selected macroeconomic variables representing economic stability in Algeria. The econometric modelling showed the limited and insignificant effect of public expenditure on GDP in the context of the lack of flexibility of the productive apparatus. A relatively positive and temporary effect was observed in the weak econometric impact of public expenditure on inflation rates, whereas the results showed an inverse relationship between public expenditure as an influencing factor and the trade balance and unemployment rates in Algeria during the study period.

In view of the unexpectedly negative effect of public expenditure on Algeria's aggregate balance indicators, it can be concluded that Algeria's overall economic balance suffers from fundamental and structural problems that, in reality, reflect the absence of structural equilibrium between financial resources represented by oil rents, expenditure policy as the channel through which these resources are allocated, and, finally, the actual implementation of these financial resources as pillars of balance in the Algerian economy. In general, this dilemma was manifested in the budget deficit resulting from expenditure increasing at a faster rate than revenues and from the dependence of expenditure on oil price fluctuations, as well as in the unproductive nature of the productive apparatus to the point of dependence on virtually every imported product. Therefore, Algeria seeks to achieve a set of economic and social objectives, such as achieving economic stability by combating unemployment and inflation, encouraging investment, and increasing economic growth rates, relying on government expenditure as one of several available instruments.

Modern economic history, and even ancient economic history, has long been associated with the rentier nature of sources and financing, or what physicists refer to as the fuel of human activity, because of its broad impact on shaping the contours of the global economic map. This resource is not merely a form of energy, but rather a vital and strategic economic resource that is essential in all fields. This reality is reflected in the expansion and multiplication of its production and consumption rates. Owing to its flexibility and diverse uses as a commodity, it has become the most powerful strategic commodity controlling the fate of the world and its economy (Makhlafi, 2013, p. A). This is particularly evident in the effects recently caused by fluctuations in its prices within the global economic system. These effects vary according to the behavior of oil prices in the global oil market. The world has repeatedly awakened to the problem of successive declines in oil prices, prompting oil-producing countries to sound the alarm and attempt to revise their development plans and programmes in order to mitigate or reduce the damage inflicted on their economies by oil price fluctuations.

Over time, oil prices have played a major role in creating economic balances between industrial countries and developing countries possessing this important resource. However, the direction and magnitude of this effect have differed according to interests. Producing countries seek to maintain persistently high oil prices because oil constitutes an important mechanism through which financial revenues are generated, upon which important policies and decisions supporting their economic development are built. Conversely, industrial countries are negatively affected by rising oil prices and therefore attempt, by various means, to control them through the political and technological power at their disposal.

Figure 15: Study



Source: Prepared

The proposed model

financial resources. The proposed model is based on the following assumptions: the channel through which the financial effect is transmitted, namely, public expenditure in both its current and investment components; and, finally, the aggregate balance indicators as an outcome of directing public expenditure policy toward its principal and optimal objective, namely, ensuring macroeconomic stability in the short, medium, and long terms.

The econometric study demonstrated, beyond doubt, the linear correlational relationship underlying the first part of the model. It became clear that petroleum taxation constitutes the pivotal component of the state's public revenues and has been, and continues to be, the primary source for financing state-funded projects. When this development is traced, it can be observed that petroleum taxation represented only a small proportion at the beginning of the 1970s, accounting for approximately 20% of total revenues. Its share subsequently increased in the following years. Each shock experienced by the oil market affected the share of oil revenues in the state budget, either positively or negatively. Econometrically, according to the causality test, a short-run relationship was found running from oil prices to public expenditure. Likewise, the long-run causality test confirmed the persistence of this relationship from oil prices to public expenditure. The impulse response tests also confirmed a corresponding response between the two variables. It became evident that a positive oil-price shock would have a positive effect on public expenditure, while a negative oil-price shock would have a negative effect on the dependent variable, public expenditure, in its different components.

As for the second part of the model, concerning the relationship between public expenditure and the four objectives of economic policy, the results were as follows:

- The coefficients of the relationship between public expenditure and growth in gross domestic product were positive, indicating a direct relationship between the two variables, but weak and limited in the short run.
- The coefficients of the relationship between public expenditure and inflation rates were positive, indicating a direct relationship between the two variables, but weak in the short run and representing inflationary pressures in the medium and long runs.
- The coefficients of the relationship between public expenditure and unemployment rates were negative, indicating an inverse relationship between the two changes.
- The coefficients of the relationship between public expenditure and the ratio of the trade balance to GDP were negative, indicating an inverse relationship between the two variables.

The tests applied to the data collected over the study period revealed a weak relationship between public expenditure and the selected macroeconomic variables used as indicators of economic stability in Algeria. The results showed the limited effect of public expenditure on GDP in the context of an inflexible productive apparatus, as well as a weak positive effect of public expenditure on inflation rates. At the same time, the results demonstrated an inverse relationship between public expenditure and the trade balance and unemployment rates in Algeria. This confirms the failure of public expenditure policy as an important instrument for achieving economic stability in Algeria, given its strong dependence on petroleum-tax revenues as a single external source of financing, coupled with structural weakness in the Algerian economy, which has resulted in the absence of flexibility in the productive apparatus.

Second: Study Conclusions

Through our modest review of the literature and analysis undertaken in preparing this research paper, we reached a set of findings in the form of research-based conclusions, which we classify as follows:

A. At the Theoretical Level

1. Algeria's Oil Dimension

- The oil industry worldwide is characterized by a set of features and characteristics that distinguish it from other industries. These include high capital intensity and advanced technology, increasing production concentration due to the presence of oil in a limited number of countries, the exhaustible nature of oil, and the possibility of discovering additional reserves.
- Oil wealth is considered the primary contributor to the development of the international economy. The development, advancement, and prosperity achieved by the world today have been driven by fossil fuels, as all economic sectors depend on energy, whose principal source is oil wealth.
- The oil market is characterized by two stages of marketing: the market for spot and forward physical exchanges, and the financial derivatives market associated with oil exchange contracts.
- Oil prices are affected by many factors, as is the case with any other commodity, such as supply and demand. However, these factors are not, in reality, sufficient to explain fluctuations in oil prices. Other factors cause oil prices to fluctuate and change according to conditions prevailing outside the market, including politics, technology, the environment, international energy organizations, natural disasters, new fossil-fuel discoveries, and others.
- Oil prices have experienced numerous fluctuations that did not last for long periods. This situation made the calculations of producing countries dependent on those prices. During periods of rising prices, the financial surpluses of these countries were spent to support their economic structures, whereas during periods of declining prices, their financial resources collapsed and the structural weaknesses of their economies became exposed.
- Algeria is among the countries that depend heavily on the export of a single major commodity, namely oil, accounting for more than 95% on average. Petroleum taxation also constitutes more than 60% of the state's general budget revenues. This situation makes the Algerian economy highly sensitive and vulnerable to changes occurring in the oil market. The sole source of funds used to finance all sectors without exception, from independence to the present day, has been revenues derived from oil wealth. Whenever oil prices declined in international markets, Algeria entered an economic crisis that evolved into a social crisis, followed by a political crisis and ultimately a security crisis.

Accordingly, and based on the foregoing, oil price fluctuations constitute one of the principal determinants of the condition of the national economy, whether in disequilibrium or equilibrium. This was confirmed by the 1986 crisis, which shifted many indicators from surplus or equilibrium to deficit, while also contributing to increases in indebtedness, inflation, and unemployment, as well as deterioration in exports, among other effects. The same applies to the subsequent price crises of 1998, 2008, and 2014, and conversely to periods of positive shocks such as 1973 and 2000.

2. The Dimension of Expenditure Policy and Economic Stability

- Public expenditure policy is considered an important and fundamental instrument of fiscal policy through which most countries seek to stimulate economic activity and support the formation of effective social capital by establishing infrastructure in the country, or, in economic terms, laying the foundations for developmental take-off.
- Public expenditure policy is an effective instrument for achieving economic policy objectives and addressing imbalances arising from the economic cycle. However, its effectiveness is linked to the state's financial capacity and the methods used to finance public expenditure, so that expenditure can have a decisive effect on aggregate demand and increase employment in accordance with the Keynesian perspective.
- It became clear to us that the Keynesian theory does not adequately apply to developing countries with regard to public expenditure, owing to the conflict between the expenditure multiplier principle and the weak flexibility of the productive apparatus in these countries.
- Public expenditure increased and grew throughout the study period, but this growth and increase fluctuated because of the economic reforms supported by the International Monetary Fund during the 1990s, which required the state to reduce public expenditure, particularly investment expenditure. Starting in 1999, the state regained its economic role, as reflected in the accelerated growth of investment expenditure at the expense of current expenditure, in implementation of the Economic Recovery Programme.
- The inflexibility of the productive apparatus, the lack of control over economic activity, external disequilibrium, and the emergence of a gap in domestic resources resulting from dependence on external financing all reflect the concept of economic instability in developing countries. This contrasts with developed countries, where economic disequilibrium is understood in terms of their failure to achieve macroeconomic policy objectives.
- With regard to the general equilibrium of the Algerian economy, it suffers from fundamental and essential problems that, in reality, reflect the absence of structural equilibrium in general. The imbalance is fundamentally structural, given the steady increases in public expenditure growth at rates exceeding the available public revenues, which are limited in their sources. Consequently, internal equilibrium was disrupted as a result of its dependence on oil revenues.

From all of this, we conclude that the state seeks, through its intervention in economic activity by means of expenditure policy, to achieve optimal economic stability. The growth of such expenditure is entirely natural given the increasing intervention of the state in economic life. To avoid imbalances resulting from excessive expenditure, particularly consumption expenditure, public expenditure must be rationalized. Such rationalization represents the practical application of optimal efficiency in allocating resources and directing them toward areas capable of generating financial returns through viable investment, thereby ensuring the achievement of desired objectives without waste or corruption. The importance of public expenditure policy in achieving economic stability is highlighted by its role as an important component of aggregate demand, based on the principle that “demand creates supply.”

B. At the Applied Level

The econometric modeling study presented in Chapter Four demonstrated that:

- The study confirmed that public expenditure policy is structurally linked to changes in oil prices, a factor that lies beyond the scope of domestic control. This has increased the fragility of the Algerian economy and made it easily vulnerable to external economic shocks, particularly those associated with oil price crises in global markets.
- In developing rentier economies, government expenditure policy is a relatively effective instrument for achieving economic policy objectives and has a weak role in addressing imbalances

arising from the economic cycle, while its contribution to influencing aggregate demand remains unclear.

- There is an inverse relationship between public expenditure, measured as a percentage of GDP, and the unemployment rate in Algeria, such that expansion in public expenditure led to a decline in unemployment rates.
- There is a weak direct relationship between public expenditure, measured as a percentage of GDP, and the inflation rate in Algeria, whereby an increase in public expenditure contributes to a slight increase in prices.
- There is a very weak direct relationship between public expenditure, measured as a percentage of GDP, and GDP growth in Algeria, whereby an increase in public expenditure contributes to a very slight increase in prices.
- We observed a clear inverse relationship between public expenditure, measured as a percentage of GDP, and the ratio of the trade balance to GDP. This is attributable to a significant leakage of public expenditure abroad in the form of imports, including food products and medicines, in addition to industrial and agricultural equipment, which limited the effectiveness of the public expenditure multiplier in the short run.
- The increase in current government expenditure relative to total public expenditure in Algeria does not have a clear effect on macroeconomic indicators and has negative productivity; consequently, it constrains economic growth. This is attributable to the economic ineffectiveness of this type of expenditure.
- In the Algerian economy, during the first part of the study period up to 1999, investment expenditure played an important role in compensating for the shortfall in private investment at that time. This component of expenditure experienced downward pressure as a result of the structural adjustment programmes imposed by the International Monetary Fund. However, it recovered beginning in 2000 as a necessity for the Economic Recovery and Economic Support Programmes. This recovery was accompanied by weak production flexibility in Algeria and the crowding out of the private sector because of the substantial resources required by government investment programmes. Finally, the weak economic performance of oil-exporting developing countries, including Algeria, is attributable to the manner in which fiscal policy responds to oil price shocks. The strong linkage between oil revenues and general budget revenues has led to instability in public expenditure policy within the national economy, which has become the principal channel through which oil price fluctuations are transmitted to the other macroeconomic variables.