Using Multiple Linear Regression Models to Measure the Impact of Fiscal and Monetary Policies on Algerian Economic Growth

Adel Beldjebel[1], Abdesselam Hellal[2]

[1]Assistant Professor (A), Batna 1 University, (Algeria). Email: adel.beldjebel@univ-batna.dz
[2]Assistant Professor (A), Batna 1 University, (Algeria). Email: abdesselam.hellal@univ-batna.dz

Abstract:
This research paper investigates the impact of fiscal and monetary policies on economic growth in Algeria. These policies play a crucial role in influencing economic growth, making their study in the Algerian context highly significant.

The paper delves into the concept of monetary and fiscal policy tools, focusing on the most important ones: money supply, interest rates, government spending, and taxes.

The results of the study reveal a relationship and a clear impact of the independent variables (monetary and fiscal policy tools) on the dependent variable (economic growth), with the exception of taxes.

Based on these findings, the research suggests several policy recommendations: Increase government spending in areas that support economic growth, such as education, healthcare, and infrastructure, Reduce interest rates to stimulate investment, Implement measures to control the money supply and maintain price stability.

Keywords: Fiscal policies, economic growth, monetary policy, government spending, money supply, interest rate, taxes

Introduction:

Achieving sustainable economic growth is a paramount objective for any nation striving for prosperity and progress. Economic policies, particularly fiscal and monetary policies, play a pivotal role in realizing this goal. Fiscal policies rely on instruments, primarily government spending and taxes, often employed to achieve equilibrium and support growth. In contrast, monetary policies aim to regulate the money supply and control interest rates to monitor inflation rates and bolster monetary stability.

Algeria, like other nations heavily reliant on oil and gas exports as a primary revenue source, faces fundamental economic challenges manifested in the impact of oil price fluctuations on the country's economic stability and sustainable growth. As these prices decline, the Algerian economy bears the brunt of the negative impact. Therefore, the significance of fiscal and monetary policies lies in their role as a crucial mechanism for addressing these circumstances and challenges to enhance economic stability by stimulating sustainable growth and steering the economy towards economic diversification. This underscores the importance of adopting sound fiscal and monetary policies to reduce oil dependence and foster sustainable economic growth.

In Algeria, the central bank, the Bank of Algeria, is responsible for setting monetary policy. The government is responsible for setting fiscal policy. Both the Bank of Algeria and the government have been working to implement policies that will support economic growth and create jobs.

- Problem Statement:

Economic studies indicate that fiscal and monetary policies can influence economic growth in any country, either positively or negatively, depending on their implementation.

Based on these studies, this research poses the following problem statement:

To what extent do fiscal and monetary policies affect the level of economic growth in Algeria?

- Significance of the Research:

The significance of this research stems from several factors, including:

- Quantitative studies examining the impact of fiscal and monetary policies on economic growth in Algeria are relatively scarce, particularly those employing the linear regression methodology.
- Linear regression models are powerful statistical tools that enable the analysis of relationships between variables with high precision, allowing for reliable estimates of the level of impact of fiscal and monetary policies on economic growth.
- The findings of this study provide valuable recommendations for formulating effective fiscal and monetary policies that play a crucial role in promoting economic growth in Algeria.

- Research Objectives:

This research aims to achieve the following objectives:

- Identify the relationship between fiscal policy and economic growth in Algeria.
- Assess the impact of monetary policy on economic growth in Algeria.
- Analyze the interactive relationship between fiscal and monetary policies and economic growth in Algeria.
- Formulate recommendations to enhance economic growth in Algeria through fiscal and monetary policies.

- Research Methodology:

The descriptive approach will be employed through the analysis of fiscal and monetary policies implemented in Algeria, in addition to the quantitative methodology by utilizing historical economic data for the period from 1990 to 2021. In estimating a multiple linear regression model to assess the relationship between fiscal and monetary policies and economic growth.

- Research Structure:

This research will be divided into three main axes, as follows:

- Axis 1: This axis addresses the theoretical framework of fiscal and monetary policies.
- Axis 2: This axis examines the fiscal and monetary policies implemented in Algeria since 1990.
- Axis 3: This axis covers the quantitative study, research results, their analysis, and interpretation.

1- Theoretical Framework of Fiscal and Monetary Policies:

Fiscal and monetary policies are considered among the most important tools of overall economic policy used by governments to influence the course of the economy and achieve its objectives. These policies aim to achieve economic stability, growth, and balance in the external balance of payments, reduce unemployment, and curb inflation.

A- Fiscal Policy Concept and Definition:

Fiscal policy is a powerful tool that governments can use to achieve a variety of economic goals. However, it is crucial to use it carefully to ensure its effectiveness.

- ✓ **Definitions of Fiscal Policy:** Several definitions of fiscal policy have been put forth; some of them can be highlighted as follows:
- It is defined as a set of tools used by the government to influence aggregate demand in the economy through government spending and taxes.
- It is defined as a set of measures taken by the government to regulate the economy by controlling government spending and government revenues (taxes).
- Fiscal policy is derived from the French word "FISC," which means the treasury or the treasury. Therefore, the term was synonymous with the term public finance as used in the English language to include government revenues, expenditures, and public debt policy. However, in modern usage, fiscal policy has a broader and different meaning, and it is associated with the government's effort to achieve stability or encourage levels of economic activity. [1]
- It can also be defined as those measures that the government takes to achieve general financial balance, using public financial means such as taxes, fees, public expenditures, and public loans, to influence macroeconomic variables and achieve the general economic policy objectives of the country. [2]
- ✓ **Fiscal Policy Instruments:**

Fiscal policy instruments include the following:

- **Government spending:** Government spending is one of the most important components of fiscal policy. The government can increase spending to stimulate the economy during recessions or decrease it to curb inflation during booms.
- **Taxes:** Taxes are a major source of government revenue and can also be used as a tool to influence consumer and business behavior. For example, the government can lower taxes to stimulate consumption and investment or raise them to reduce aggregate demand.

Governments typically employ fiscal policy to achieve a range of economic objectives, including:

- **Stimulating economic growth:** To boost production and raise employment levels, the government can stimulate demand for goods and services by increasing government spending or lowering taxes[3].
- **Income distribution:** The government can utilize government spending to provide social services or income subsidies, which helps distribute income more equitably.[4]
- **Reducing inflation:** In instances where production is inflexible, the government can increase taxes or reduce government spending to lower overall demand for goods and services, leading to a decline in prices.
- **Decreasing the fiscal deficit:** To reduce the budget deficit, the government can raise taxes or lower government spending.

---

[1] - **Mohammed Hilmi Al-Tabi,** The Impact of Sharia Fiscal Policy on Achieving General Financial Balance in the Modern State, 1st Edition, Dar Al-Fikr Al-Jamia, Alexandria, 2007, p10.

[2] - **Kanaan Ali,** Economics of Money and Fiscal and Monetary Policies, 1st Edition, Dar Al-Hassanin Publications, Damascus, 1997, p219.

[3] - Khadija Al-Aseer, Economics of Public Finance, Dar Al-Kutub Al-Masryah, Cairo, Egypt, 2016, p283

[4] - Muhammad Najat Halla Sediqi, Teaching Islamic Economics, (Public Finance), 1st Edition, King Abdulaziz University Press, Saudi Arabia, 2016, p18

Fiscal policy can have a profound impact on the economy. It can aid in stimulating economic growth or lowering inflation, but it can also lead to an increase in the fiscal deficit or national debt.

✓ **Effectiveness of Fiscal Policy:**

The effectiveness of fiscal policy depends on a range of interrelated factors, requiring sound design and accurate implementation while considering economic, political, and social conditions. Some of these factors relate to policy design, while others relate to the macroeconomic environment.

i. Factors Related to Policy Design:

- Fiscal policy objectives should be clear, specific, and measurable.
- The components of fiscal policy should be consistent with each other and support the specified objectives.
- The government should be committed to implementing the announced fiscal policy and demonstrate the ability to manage public finances efficiently.
- Fiscal policy should be flexible enough to adapt to changes in economic conditions.
- Information about fiscal policy should be publicly available and explained in a clear and understandable manner.

ii. Factors Related to the Macroeconomic Environment:

- Economic conditions: Fiscal policy is more effective in stable economies while it may face greater challenges in application in economies experiencing recessions or high inflation.
- Institutional structure: Effective fiscal policy requires a strong institutional structure, including an efficient tax system and a sound financial management system.
- External conditions: External factors, such as financial crises or natural disasters, can affect the effectiveness of fiscal policy.
- Economic behavior: The effectiveness of fiscal policy is influenced by the behavior of various economic actors, such as consumers, investors, and businesses.

Secandly : Monetary Policy-Concept and Definition

The term "monetary policy" first appeared in economic literature in the late 19th century, while the practice of using certain monetary tools dates back to much earlier periods. The role of monetary policy became particularly prominent following repeated economic crises. The definition of monetary policy has varied due to differences in ideological orientations and the economic, political, and social environments of each country. [5]

B. Monetary Policy Concept and Definition:

✓ **Definitions of Monetary Policy :**Monetary policy can be defined as the set of tools used by monetary authorities, such as the central bank, to influence the supply of money and interest rates in the economy. It can also be defined as the set of tools used by the government or monetary authority to influence economic activity by affecting its cash balance.[6]

It is also known as the set of measures taken by monetary authorities to control the supply of money, by making changes in the quantity of money (quantity of means of payment) or the supply of money in accordance with the economic conditions of the

---

[5] - Nadia Al-Aqqoun, The Impact of Monetary Policy on Economic Growth in Algeria: An Analytical Study for the Period (0991-0010), Annals of Qalma University of Social and Human Sciences, No. 01, Qalma University, December 0102, p225.

[6] - Beiton Alair, Christophe Rodriges, "Economie Monétaire, Théories Police", ARMANDCOLIN, MALAKOFF, 2017,P257

country, where monetary authorities seek through these measures to inject the economy with the desired amount of money or to leak and absorb the unwanted amount of money. It can also be defined as the control that the government, central bank, or monetary authority of a country imposes to control the money supply, financial liquidity, and interest rates in order to achieve a set of goals directed towards growth and economic stability. [7]

✓ **Monetary Policy Instruments:**

Monetary policy instruments include the following:

- **Open market operations:** Open market operations are one of the most important tools of monetary policy. The central bank can buy or sell government bonds in the open market. Buying bonds increases the money supply in the economy, while selling them decreases it.

- **The repurchase rate:** The repurchase rate is the interest rate that the central bank charges commercial banks on the money they borrow from it. The central bank can lower the repurchase rate to stimulate lending and investment or raise it to reduce the money supply.

- **Reserve requirements:** Reserve requirements are the percentage of deposits that commercial banks must hold with the central bank. The central bank can increase reserve requirements to reduce the money supply or lower them to stimulate it.

2- Fiscal and Monetary Policies in Algeria:

The state budget is the fiscal policy pursued in Algeria, which includes government expenditures and revenues. Monetary policy, on the other hand, is the measures taken by the Bank of Algeria, the Algerian central bank, to regulate the amount of money circulating in the economy.

First: Fiscal Policy:

The Algerian government uses a range of tools in fiscal policy, including:

- **A- Government spending:** The government can increase government spending to stimulate economic growth or reduce government spending to control the budget deficit. Algeria's entry into the debt crisis forced it to resort to international institutions for borrowing, which in turn imposed economic reform and structural adjustment programs. This was reflected in Algeria's adoption of a fiscal policy based on rationalizing public expenditures and increasing tax revenues to cover the general budget deficit. However, with the rise in oil prices, Algeria has adopted an expansionary fiscal policy by expanding public expenditures and attempting to increase public revenues and diversify their sources.

- **Development of public expenditures:**

- **Development of public expenditures during the period 1990-1999:**

The 1990s in Algeria were characterized by a comprehensive structural reform phase imposed by the International Monetary Fund,[8] aimed primarily at reducing government spending and limiting the chronic fiscal deficit. Despite adopting a discourse of reducing spending, this period witnessed a remarkable development in government expenditures. What are the factors that led to this contradiction between reform discourse and state behaviors?

---

[7] - Iordachioaia Adelina-Geanina, TituMaioresou, Monetary Policy and Economie Policy, Journal of knowledge management, economies and information tecknology, volume 1, Issue no :2 university of Romania 2011, p3.

[8] - Amal Maat Allah, The Effects of Fiscal Policy on Economic Growth: An Empirical Study of the Case of Algeria (1970-2012), Master's Thesis, University of Abderrahmane Belkaid, Tlemcen, 2014-2015, p: 274.

- **Security crises:** Algeria faced a suffocating security crisis during the 1990s due to the phenomenon of terrorism, which led to a huge increase in spending on defense and security to absorb the costs of fighting terrorism and protecting citizens.
- **Social pressures:** The 1990s were characterized by high unemployment and poverty rates, which prompted the government to increase spending on social programs and support vulnerable groups, such as:
- **Food support:** Large sums were allocated to support basic food items, such as sugar, oil, and grains, to mitigate the severity of the living crisis on citizens.
- **Social programs:** Wide-ranging social programs were launched, including:
- **Education:** The education infrastructure was expanded, new schools were built, and greater educational opportunities were provided for the younger generation.
- **Health:** Health services were improved, medicines and medical supplies were provided, and new hospitals were built.
- **Housing:** Social housing programs were launched to provide housing for low-income people.
- **Public investments:** Despite the government's efforts to reduce spending, it allocated significant amounts to public investments in vital areas, such as improving road and transport networks and building vital facilities, such as ports, airports, power plants, and supporting some productive sectors such as agriculture.

Table (01): Development of public expenditures during the period (1990-1999). Unit: billion DA

Years	Public Expenditures	Growth Rate
1990	134,400	/
1991	195,800	45.7
1992	320,200	63.5
1993	425,300	32.8
1994	461,800	8.6
1995	589,300	27.6
1996	724,600	23.0
1997	845,300	16.7
1998	875,739	3.6
1999	961,682	9.8

Source: Prepared by the researchers based on World Bank reports.

The table shows that the growth rate of expenditures witnessed a remarkable increase in the early 1990s, but in 1994, this growth only reached 8%. This was due to the security and economic conditions that the country was going through, so capital expenditures were reduced due to the state's ability to reduce them, unlike current expenditures. However, the year 1996 saw an improvement in the growth rate of expenditures, reaching 23%, which was reflected in the growth of capital expenditures. Looking at the structure of these expenditures, there is an imbalance between current and capital expenditures, as current expenditures accounted for more than 74% during this period. The successive increase in this type of expenditure is due to

the state's assumption of the essential tasks entrusted to it, such as the regular management of the central and local public administration, education, health, etc., and the state's ability to pressure capital expenditures and reduce them.[9]

- **Development of Public Expenditures during the period 2000-2021.**

Government spending in Algeria has undergone significant transformations since 2000, characterized by a remarkable increase and changes in its structure. These developments have been influenced by multiple factors, including rising oil prices, economic growth, increasing social needs, and political changes.

The development of government spending in post-2000 Algeria can be divided into three main periods:

➢ **Period of High Growth (2000-2014):**

This period witnessed a sharp rise in government spending driven by soaring oil revenues. A significant portion of this increase in spending was allocated to public investments. Current expenditures, particularly on wages and social support, also rose during this period. Investment programs were implemented during this period, such as the Economic Recovery Support Program (2001-2004)[10] and the Complementary Growth Support Program (2005-2009). During this period, government spending witnessed a considerable increase, rising from 961.7 billion DA in 1999 to 1888.9 billion DA in 2004 and to 4246.3 billion DA in 2009, reaching 7169.9 billion DA in 2012. This increase was primarily attributed to the surge in oil prices in global markets, from $27.72 per barrel in 2000 to $92.57 per barrel in 2008 and $102.58 per barrel in 2011. Additionally, the authorities implemented economic recovery and growth support programs based on injecting substantial financial resources into the economy. Following this period came the implementation of the Economic Growth Consolidation Program (Five-Year Development Program) (2010-2014), which is the largest development program undertaken in Algeria since independence with a financial envelope of approximately $286 billion. This program was part of the expansionary fiscal policy pursued by the state. As an assessment of government expenditures in Algeria during the implementation of this program, it is observed that they recorded a significant leap, jumping from 4466.94 billion DA in 2010 to 6995.7 billion DA in 2014, representing an increase of 56%. This increase can be attributed to the expansionary fiscal policy pursued by the state within the framework of the implementation of the five-year program.

➢ **Period of Relative Stability (2015-2019):**

This period witnessed a decline in government revenues due to the collapse of oil prices,[11] but the government was able to maintain the stability of government spending by reducing public investments and rationalizing current expenditures. During this period, the focus was on improving the quality of government spending and directing it towards priority sectors such as

---

[9] - Nadhir Yassin, The Impact of Fiscal and Monetary Policy on Unemployment in Algeria: An Empirical Analytical Study for the Period (1970-2010), Master's Thesis, University of Algiers 03, Algeria, 2012, p: 30.

[10] - Zerouat Fatima Zohra, Mohamed Menad: "Development of Public Expenditures in Algeria and Its Impact on Economic Growth for the Period 1999-2014", Journal of Finance and Markets, 10/03/2015, Volume 02, Issue 01, p. 19.

[11] - Nadhir Yassin, The Impact of Fiscal and Monetary Policy on Unemployment in Algeria: An Empirical Analytical Study for the Period (1970-2010), Master's Thesis, University of Algiers 03, Algeria, 2012, p: 30

education and health. For example, in 2017, government expenditures witnessed a slight decrease compared to 2016, falling by about 6.8%.[12]

It then rose slightly in 2018, but with the continued decline in oil prices and the outbreak of a severe health crisis, public expenditures fell again to 10.0% in 2019.

> ➢ **Period of New Challenges Post-2020:**

Algeria faced new challenges during this period, including the COVID-19 pandemic and the decline in oil prices once again. This led to a significant decline in government revenues and a widening of the fiscal deficit, prompting the government to make efforts to adjust government spending while focusing on protecting vital social programs and strengthening long-term financial sustainability.

The structure of government spending in Algeria has undergone significant changes during this period, with the share of public investments in total government spending decreasing, while the share of current spending and the share of social spending in total current spending have increased.

Table (02): Development of public expenditures during the period (2000-2021). Unit: billion DA

Years	Public Expenditures	Growth Rate	Years	Public Expenditures	Growth Rate
2000	1,178,122	100	2011	5,853,569	31.0
2001	1,321,028	12.1	2012	7,058,173	20.6
2002	1,550,646	17.4	2013	6,635,620	-6.0
2003	1,639,265	5.7	2014	6,995,700	5.4
2004	1,888,930	15.2	2015	7,747,214	10.7
2005	2,052,037	8.6	2016	7,383,600	-4.7
2006	2,453,014	19.5	2017	6,883,200	-6.8
2007	3,108,669	26.7	2018	8,628,000	25.3
2008	4,191,053	34.8	2019	7,741,300	-10.3
2009	4,246,334	1.3	2020	6,902,900	-10.8
2010	4,466,940	5.2	2021	8,000,000	15.9

Source: Prepared by the researchers based on World Bank reports.

C- Tax Policy:

Tax revenues are one of the most important sources of financing the general budget in Algeria and play a major role in financing public spending and achieving economic and social development. Tax revenues in Algeria have witnessed significant developments over the past decades, influenced by various factors such as:

- **Changes in oil prices:** Algeria is heavily dependent on oil and gas revenues, and therefore fluctuations in the prices of these commodities in global markets have a direct impact on tax revenues.
- **Tax policies:** Changes in tax laws and regulations affect the level of tax revenues, such as the introduction of new taxes or the modification of existing tax rates.
- **Economic growth:** Economic growth leads to an increase in incomes and profits, which in turn leads to higher tax revenues.

  Figure (01): Development of tax revenues in Algeria during the period 1990-2021

---

[12] - Bank of Algeria. (2018, July). Annual Report 2017: Economic and Monetary Developments in Algeria, p63
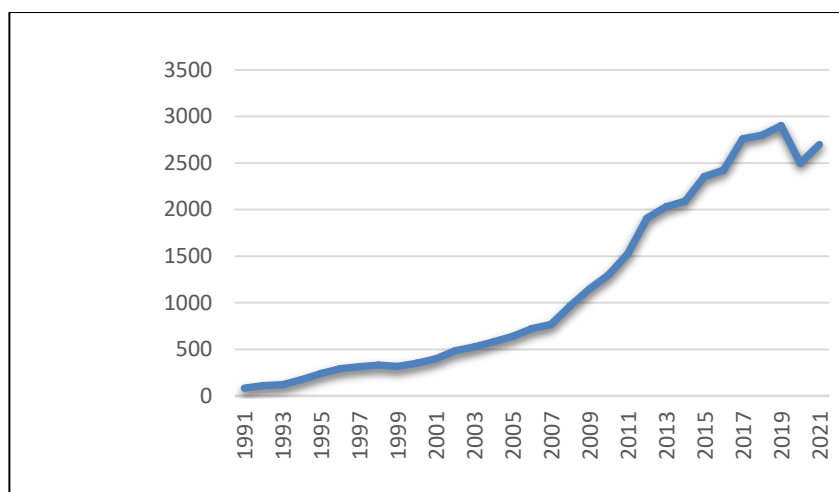
Source: Prepared by the researchers based on World Bank reports.

Tax revenues have witnessed a successive increase. For example, tax revenues in 2000 amounted to about 1.300 billion Algerian dinars. They reached 2.800 billion Algerian dinars in 2010.[13]

During 2011, tax revenues reached 3066.5 billion dinars compared to 3427.6 billion dinars in 2012, thus increasing by 361 billion dinars, with fuel taxes contributing 44.3% of total tax revenues. In 2014, tax revenues reached 4696 billion dinars, but then decreased to 4077.6 billion dinars in 2015, representing a decrease of 12.6%. This decrease was due to the decline in fuel revenues (equivalent to 30% of the decrease). In 2017, the rise in the average oil price to approximately $54 per barrel, after it was $45 per barrel in 2016, led to a significant increase in tax revenues, which amounted to 4790 billion dinars in 2017. As a result of the economic recession experienced by the country due to the spread of the Corona pandemic, tax revenues decreased to 2500 billion dinars, or by 13.8% compared to 2019. Then, tax revenues witnessed a noticeable increase in 2021 as a result of the economic recovery due to the recovery of oil prices after the Corona pandemic and the economic boom, with tax revenues reaching 2700 billion dinars. Tax revenues reached 3,500 billion Algerian dinars in 2022.

The upward trend: In general, tax revenues in Algeria during the period from 1990 to 2022, with the exception of some temporary declines in some years, is mainly due to the reliance on oil, as oil and gas revenues play a major role in tax revenues in Algeria, where they constitute between 60% to 70% of total tax revenues, in addition to the tax reforms that have been implemented in Algeria in recent years to improve the efficiency of the tax system and increase tax revenues.

Secondly: Monetary Policy Tools:

The Bank of Algeria uses a range of tools in monetary policy, including:

A-Interest rates: The Bank of Algeria can raise interest rates to reduce demand for money and increase interest rates, or lower interest rates to increase demand for money and lower interest rates.

- Development of interest rates in Algeria:

---

[13] - Mohamed Bouknadel, Samia Bekadour: "The Role of Tax Revenues in Balancing the General Budget in Algeria: An Analytical Study for the Period 2010-2018", Algerian Journal of Public Finance 2170-1881 ISSN -, Volume 12 / Issue: 02, (2022), p 95

▪ **Pre-1990s:**

i- State control: During this period, the state set interest rates administratively, without regard to market mechanisms. What distinguished interest rates is that they were generally low during this period, which exacerbated the problem of inflation. Where nominal interest rates on loans remained at a fixed level of 75.3% for many years, where it continued from 1962 to 1971, and nominal interest rates on loans were reduced from 1972 to 1985 to become 75.2%, or a decrease of 1%, in support of the policy of establishing national companies, within the framework of the implementation of the first and second four-year plan, while the discount rate applied by the central bank to public banks is the same as interest rates on loans, which was 75.3% from independence to 1972, where interest rates were reduced, until the beginning of the oil crisis and the debt crisis, where measures were taken to gradually liberalize interest rates. From this it is clear that the public banks were not forced to bear the risks of non-payment or the risks of bankruptcy.

▪ **1990s:**

ii- Economic reforms: The 1990s saw economic reforms that included the liberalization of interest rates.

iii- Interest rate fluctuations: Interest rates rose significantly during this period to achieve financial stability and combat inflation. Where the monetary authorities found themselves forced to adopt a policy of gradual liberalization of interest rates in order to provide the best compensation for savings in order to mobilize and direct it towards financing investment, on the one hand, and on the other hand, to force institutions to rationalize their behavior by giving borrowing its real cost, the trend towards liberalization of interest rates in light of the conclusion of the 89-1991 standby credit agreements and in light of the medium-term structural adjustment program agreements 1994-1998, in preparation for the establishment of a money market for the financial market. Interest rates were liberalized in stages and in a manner consistent with economic reforms to achieve macroeconomic stability. Basically, the liberalization of interest rates on deposits of commercial banks began in May 1989. As for the liberalization of lending rates, it was gradual, which led to a rise in interest rates in the early 1990s compared to the central planning stage, where the lending rate was 17.11% while the interest rate was 05% from 1986 to 1989, and an important step was taken under the structural reform program in early 1994 when the maximum on lending rates from commercial banks to the public was removed, and this was accompanied by a temporary ceiling of five percentage points on the difference between the deposit interest rate and the lending rate from commercial banks, in order to prevent an excessive increase in lending rates, and this measure was canceled in December 1995, and finally led to the liberalization of interest rates.

▪ **Post-2000:**

Relative stability: This period witnessed a relative stability in interest rates, with some temporary fluctuations, as oil prices played a significant role in the development of interest rates during this period, where they rose with the rise in oil prices and vice versa.

In recent years, interest rates have fallen to stimulate economic growth and support investment, then came the COVID-19 pandemic: where this pandemic led to a new decline in interest rates to support the economy during this difficult period.

Figure (02): Development of the lending interest rate in Algeria during the period 1990-2022.

Source: World Bank data

https://data.albankaldawli.org/indicator/FR.INR.LEND?locations=DZ
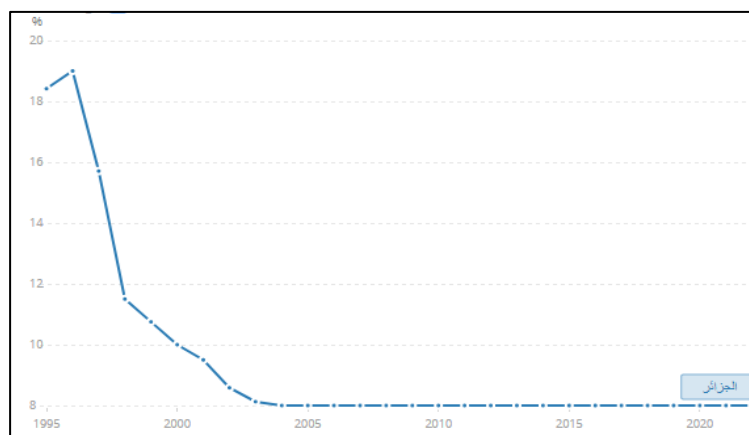
B- Open market operations:

The Bank of Algeria can buy or sell treasury bills to influence the amount of money circulating in the economy.

C- Development of the money supply during the period 1990-2021:

After the issuance of the Monetary and Credit Law No. 90/10[i], which stipulated a number of reforms related to the banking system and granted full independence to the central bank, this period witnessed an increase in the circulating money supply or what is known as the money supply, which was estimated at 420.539 billion in 1990[ii]. In 1999, the circulating money supply was estimated at 1789.4 billion dinars.

It rose in 2000, where the money supply was estimated at 2022.5 billion dinars, and it continued to rise until it reached 14,974.6 billion dinars[iii] in 2017. The reason for this increase is due to the increase in the size of the Algerian economic activity, which we will discuss in detail in the comparative study of the money supply and its impact on economic growth in Algeria from 1990 to 2021.

Thirdly: Challenges facing fiscal and monetary policies in Algeria:

Algeria's economy is characterized by its reliance on hydrocarbon exports, making it vulnerable to fluctuations in global energy prices. This, coupled with a growing population and a young demographic structure, presents significant challenges for policymakers seeking to maintain macroeconomic stability and promote sustainable growth. Here are some of the key challenges facing monetary and fiscal policies in Algeria:

a. Diversifying the Economy:

- **Overdependence on hydrocarbons:** Algeria's heavy reliance on hydrocarbon exports for government revenue and foreign exchange earnings exposes the economy to external shocks and limits its ability to achieve sustainable growth. Diversifying the economy by promoting non-hydrocarbon sectors, such as agriculture, manufacturing, and tourism, is crucial for reducing vulnerability and fostering long-term growth.

b. Managing Public Finances:

- **Fiscal discipline:** Algeria has historically experienced fiscal deficits, driven by expansionary spending and volatile hydrocarbon revenues. Implementing a disciplined fiscal framework, including strict expenditure controls and revenue diversification measures, is essential for reducing budget imbalances and ensuring long-term fiscal sustainability.

c. Promoting Financial Inclusion:

- **Limited access to finance:** A significant portion of the Algerian population remains unbanked or underbanked, hindering access to financial services and impeding economic participation. Expanding financial inclusion through targeted policies, such as financial literacy programs and innovative financial products, can boost economic activity and promote inclusive growth.

d. Enhancing Employment Opportunities:

- **High unemployment rates:** Algeria faces a persistent challenge of high unemployment, particularly among youth. Addressing this issue requires a multifaceted approach that includes skills development, entrepreneurship support, and labor market reforms to enhance employability and job creation.

e. Addressing Inflationary Pressures:

- **Rising inflation:** Algeria has experienced periods of high inflation, driven by factors such as supply chain disruptions, global price movements, and domestic demand pressures. Effective monetary policy tools, complemented by fiscal discipline and supply-side reforms, are crucial for maintaining price stability and protecting purchasing power.

f. Strengthening Institutional Frameworks:

- **Enhancing governance and transparency:** Strengthening governance and transparency in both the public and private sectors is essential for promoting sound economic decision-making, fostering investor confidence, and reducing corruption risks.

g. Embracing Technological Advancements:

- **Digital transformation:** Embracing digital technologies and promoting innovation can enhance productivity, improve efficiency, and create new opportunities for businesses and individuals.

h. Adapting to Climate Change:

- **Climate resilience:** Algeria is vulnerable to the impacts of climate change, such as water scarcity and extreme weather events. Integrating climate adaptation measures into economic planning and policies is crucial for building resilience and protecting long-term growth prospects.

Addressing these challenges effectively requires a comprehensive and coordinated approach that involves policymakers, the private sector, and civil society. By implementing sound macroeconomic policies, fostering a conducive business environment, and investing in human capital, Algeria can achieve sustainable and inclusive growth, improve living standards for its citizens, and secure a prosperous future

3- Measuring the impact of fiscal and monetary policies on Algerian economic growth :

Measuring the impact of fiscal and monetary policies on Algerian economic growth is a complex task that requires rigorous econometric analysis and careful consideration of the country's specific economic context. Here's a general overview of the approaches and challenges involved in such an endeavor:

First: Defining the study variables.

In order to study the impact of monetary and fiscal policies on economic growth, it is necessary to define government spending and taxes, money supply and interest rates as independent variables, and economic growth as a dependent variable. We symbolize each variable with the following symbol:

- **GDP**: Growth rate

- **G**: Government spending.
- **T**: Taxes.
- **M**: Money supply.
- **R**: Interest rate.

Secondly: Estimating the regression model.

Regression analysis is used as a statistical tool to explain changes in one variable called the dependent variable (dependentvariable) as a function of changes in one or more variables called independent variables (independentvariables) through an equation like: Y = f(X)

where Y: the dependent variable, and X: the independent or explanatory variable, and (f) refers to the function

- **A multiple linear regression model can be estimated, which is written in the following form:**

$$R_t = \hat{a}_0 + \hat{a}_1 DG_t + \hat{a}_2 T_t + \hat{a}_3 MM_t + \hat{a}_4 Imp_t + \varepsilon_t$$

where:

- $\hat{a}_0$: It is called a constant or fixed, meaning that on the graph it represents the point where the straight line intersects the vertical axis, which is the axis of the dependent variable (Y), and mathematically it is the value of (Y) when (X) is equal to zero, meaning that it is a fixed value and therefore it is called the constant of the equation.
- $\hat{a}_1 , \hat{a}_2, \hat{a}_3 , \hat{a}_4$: They are called the coefficients of the model, where:
- $\hat{a}_1$: Represents the change in the dependent variable (Y) when the independent variable (DG_t) changes by one unit, keeping the other independent variables constant.
- $\hat{a}_2$: Represents the change in the dependent variable (Y) when the independent variable (T_t) changes by one unit, keeping the other independent variables constant.
- $\hat{a}_3$: Represents the change in the dependent variable (Y) when the independent variable (MM_t) changes by one unit, keeping the other independent variables constant.
- $\hat{a}_4$: Represents the change in the dependent variable (Y) when the independent variable (Imp_t) changes by one unit, keeping the other independent variables constant.
- ε_t: It is the random error term, which represents the difference between the observed value of the dependent variable (Y) and the predicted value of the dependent variable $\hat{Y}$

To estimate the regression coefficients, we use the Ordinary Least Squares (OLS) method.

Using the Eviews09 program, the appropriate regression model was estimated, and the following table shows that.

Table (03): Represents the estimation of the economic growth model in Algeria on the tools of monetary and fiscal policy.

Dependent Variable: R
Method: Least Squares
Date: 11/26/23   Time: 00:38
Sample: 1990 2021
Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M	-0.006505	0.000427	-15.23419	0.0139
I	-0.356421	0.079886	-4.461620	0.0478
DG	0.008120	0.001181	6.881360	0.0270
IMP	-0.000474	0.003088	-0.153635	0.8790
C	6.919056	2.324155	2.977020	0.0061

R-squared	0.239551	Mean dependent var	2.493750
Adjusted R-squared	0.126892	S.D. dependent var	2.434952
S.E. of regression	2.275225	Akaike info criterion	4.624636
Sum squared resid	139.7695	Schwarz criterion	4.853657
Log likelihood	-68.99418	Hannan-Quinn criter.	4.700550
F-statistic	2.766338	Durbin-Watson stat	1.816679
Prob(F-statistic)	0.049000		

Source: Prepared by the researchers based on the outputs of the Eviews.12 program.
And therefore, the estimated regression model is given by the following relationship:

- **The estimates of the model showed that:** The coefficient of the money supply variable has a negative sign; That is, for every unit increase in the size of the money supply in Algeria, the growth rate decreases by 0.0065. Therefore, there is a negative relationship between the money supply and the economic growth rate in Algeria.
- **The estimates of the model showed that:** The coefficient of the interest rate variable has a negative sign; That is, for every unit increase in the interest rate in Algeria, there is a decrease in the growth rate by 0.35. Therefore, there is an inverse relationship between the interest rate and the economic growth rate in Algeria.
- **The estimates of the model showed that:** This coefficient has a positive sign; That is, for every unit increase in the ratio of government spending in Algeria, it has a positive impact on the growth rate by 0.0081. Therefore, there is a positive correlation between government spending and the growth rate in Algeria.
- **The estimates of the model showed that:** It has a negative sign; That is, for every unit increase in taxes in Algeria, the growth rate decreases by 0.00047. Therefore, there is an negative relationship between taxes and the economic growth rate in Algeria.

Thirdly: Study the validity of the estimated model.

In order to ensure the validity of the estimated model, a number of statistical tests were conducted, including:

- **The coefficient of determination (R^2):[14]**

$$R^2 = \frac{SCE}{SCT} = \frac{\sum_i (\hat{y}_i - \bar{y})^2}{\sum_i (y_i - \bar{y})^2}$$

$$R^2 = 1 - \frac{SCR}{SCT}$$

$$R^2 = 1 - \frac{\sum_i (y_i - \hat{y}_i)^2}{\sum_i (y_i - \bar{y})^2}$$

The coefficient of determination (R^2) is 0.239, which indicates a weak positive relationship between the dependent variable (GDP) and the independent variables (government spending, taxes, money supply, and interest rate). This means that the independent variables explain only 23.9% of the variation in GDP. The remaining 76.1% of the variation is likely due to other factors that are not included in the model.

- **Student's t-test for the significance of the model parameters:**
- **Testing the significance of the parameter ($\hat{a}_0$):**

We test the following hypothesis: $\begin{cases} H_0: \hat{\boldsymbol{a}}_0 = 0 \\ H_1: \hat{\boldsymbol{a}}_0 \neq 0 \end{cases}$

- If we have $\left| t_{\hat{a}_0} \right| > t_{n-4-1}^{1-\alpha/2}$, then we reject the null hypothesis at a significance level of 5%, and vice versa. Where:

$$\left| t_{\hat{a}_0} \right| = \frac{\hat{a}_0}{\sqrt{v(\hat{a}_0)}} = 2.97$$

$$t_{n-5}^{1-\alpha/2} = t_{27}^{0.025} = 2.052 \quad \bullet$$

---

[14] - M. Tenenhaus, « Statistique : Méthodes pour décrire, expliquer et prévoir », Dunod, 2007,p31.

We note that $|t_{\hat{a}_0}| > t_{n-5}^{1-\propto/2}$, which means that the study rejects the null hypothesis, meaning that the parameter $\hat{a}_0$ is significant (has an economic meaning) at a significance level of 5%.

- **Testing the significance of the parameter ($\hat{a}_1$):**

    We test the following hypothesis: $\begin{cases} H_0: \hat{a}_1 = 0 \\ H_1: \hat{a}_1 \neq 0 \end{cases}$

- If we have $|t_{\hat{a}_1}| > 2,052$, then we reject the null hypothesis at a significance level of 5%, and vice versa. Where:

$$|t_{\hat{a}_1}| = \frac{\hat{a}_1}{\sqrt{v(\hat{a}_1)}} = 15.23$$

$$t_{n-3}^{1-\propto/2} = 2.052$$

We note that $|t_{\hat{a}_1}| > t_{n-5}^{1-\propto/2}$; which means that the study rejects the null hypothesis, meaning that the parameter $\hat{a}_1$ is significant at a level of 5%, meaning that indeed the money supply affects the growth rate.

- **Testing the significance of the parameter ($\hat{a}_2$):**

    We test the following hypothesis: $\begin{cases} H_0: \hat{a}_2 = 0 \\ H_1: \hat{a}_2 \neq 0 \end{cases}$

    If we have $|t_{\hat{a}_2}| > 2,052$, then we reject the null hypothesis at a significance level of 5%, and vice versa. Where:

$$|t_{\hat{a}_2}| = \frac{\hat{a}_2}{\sqrt{v(\hat{a}_2)}} = 4.46$$

We note that $|t_{\hat{a}_2}| > 2,052$; which means that the study rejects the null hypothesis, meaning that the parameter β3 is significant at a level of 5%, meaning that indeed the interest rate affects the growth rate.

- **Testing the significance of the parameter ($\hat{a}_3$):**

    We test the following hypothesis: $\begin{cases} H_0: \hat{a}_3 = 0 \\ H_1: \hat{a}_3 \neq 0 \end{cases}$

    If we have $|t_{\hat{a}_2}| > 2,052$, then we reject the null hypothesis at a significance level of 5%, and vice versa. Where:

We note that $|t_{\hat{a}_2}| > 2,052$; which means that the study rejects the null hypothesis, meaning that the parameter β4 is significant at a level of 5%, meaning that indeed public spending affects the growth rate.

- **Testing the significance of the parameter ($\hat{a}_4$):**

    We test the following hypothesis: $\begin{cases} H_0: \hat{a}_4 = 0 \\ H_1: \hat{a}_4 \neq 0 \end{cases}$

    If we have $|t_{\hat{a}_4}| > 2,052$, then we accept the null hypothesis at a significance level of 5%, and vice versa. Where:

We note that $|t_{\hat{a}_2}| < 2,052$; which means that the study accepts the null hypothesis, meaning that the parameter $\hat{a}_4$ is not significant at a level of 5%, meaning that taxes have no significant effect on the growth rate.

- **Fisher test:**

This is a test of the overall significance of the model, where we test the following hypothesis: $\begin{cases} H_0 : \hat{a}_\iota = 0 \\ H_1 : \hat{a}_\iota \neq 0 \end{cases}$

To prove one of the two hypotheses, we compare the calculated Fisher statistic, which is symbolized by the symbol (F_{cal}), with the tabulated Fisher statistic (F_{tab}). Where:

$$F_{cal} = \frac{SCE}{k} \Big/ \frac{SCR}{n-k-1} = \frac{R^2}{k} \Big/ \frac{(1-R^2)}{(n-k-1)} = 2.76$$

Then it is compared with the tabulated Fisher statistic, which is written as:

$$F_{tab} = F_{1-\alpha}(4; 27) = 2.73$$

From the results obtained, we note that $F_{cal} > F_{tab}$; which means that we reject the null hypothesis, meaning that the model has overall significance at a significance level of 5%.

- **Test for autocorrelation of errors: Durbin-Watson test:**

This test allows us to study the autocorrelation of first-order errors where: $\quad \varepsilon_t = \rho \varepsilon_{t-1} + v_t$

DW = 1,81

$$DW = \frac{\sum_{t=2}^{n}(e_t - e_{t-1})^2}{}$$

DW = 1.81
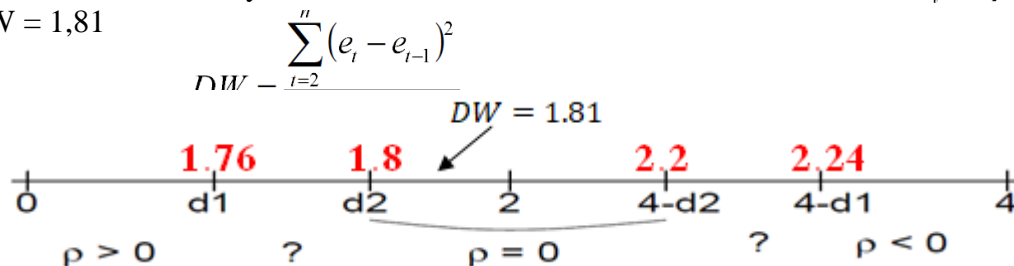
We observe that the value of the statistic (DW) falls within the area of no autocorrelation of errors.

Based on the study of the validity of the model, we can conclude that the model is acceptable and suitable for forecasting. Therefore, it can be said that public spending in Algeria has a weak positive effect on the growth rate; at the same time, the money supply and interest rates have a weak negative effect on economic growth in Algeria.

Conclusion:

The monetary and fiscal policy tools used in Algeria have their impact on the growth rate in Algeria. This is what was proven by the empirical study of the impact of the tools of these two policies, represented by government spending, money supply, interest rate, and taxes on the growth rate, where we concluded that these variables, with the exception of taxes, have a weak effect on the level of the growth rate, which does not exceed 23%. This means that the higher the levels of spending, the more the Algerian economy will recover and the growth rate will rise, while if interest rates or the money supply rise, this will have a negative impact on economic growth in Algeria. While the study proved that there is no significant relationship between taxes and economic growth, this leads us to conclude that government spending has been directed in recent years towards production, as well as for the money supply, which, whenever it rises, is not met with a rise in real production, but rather a rise in consumption. This makes it necessary to address the rise in the size of the money supply so that it does not negatively affect the Algerian economy.

- Results of the study:

The results of the study indicate that fiscal policy in Algeria has a positive impact on economic growth, as an increase in government spending leads to an increase in aggregate demand for goods and services, which leads to an increase in production and economic growth.

As for monetary policy, the results indicate that interest rates and the money supply have a negative impact on economic growth, as rising interest rates increase the cost of borrowing, which leads to a decrease in investment and economic growth. Rising money supply also leads to rising inflation, which leads to a decrease in the purchasing power of individuals and businesses, which in turn leads to a decrease in aggregate demand and economic growth.

- Research recommendations:

Based on these results, and in order to improve the effectiveness of fiscal and monetary policies in influencing economic growth in Algeria, the following is recommended:

- Increase government spending in areas that support economic growth, such as education, health, and infrastructure.
- Lower interest rates to stimulate investment.
- Adjust the money supply to control inflation.

In addition to these general recommendations, the following recommendations can be made, based on the characteristics of the Algerian economy:

- Encourage foreign direct investment by providing appropriate incentives.
- Support Algerian exports through promotion and support programs.
- Improve business infrastructure to facilitate business practices.
- Reduce the Algerian economy's dependence on oil: by diversifying the Algerian economy and increasing investment in non-oil sectors.
- Reduce unemployment rates: by increasing investment in education and training and providing job opportunities.
- Strengthen financial institutions: by strengthening oversight of financial institutions and combating unlicensed financial institutions.

These recommendations are based on the research results, which indicate that fiscal and monetary policies can affect economic growth in Algeria, but this effect depends on a number of factors, including the Algerian economy's dependence on oil, unemployment rates, and the strength of financial institutions.

REFERENCE

1. Mohammed Hilmi Al-Tabi, The Impact of Sharia Fiscal Policy on Achieving General Financial Balance in the Modern State, 1st Edition, Dar Al-Fikr Al-Jamia, Alexandria, 2007.
2. Kanaan Ali, Economics of Money and Fiscal and Monetary Policies, 1st Edition, Dar Al-Hassanin Publications, Damascus, 1997.
3. Khadija Al-Aseer, Economics of Public Finance, Dar Al-Kutub Al-Masryah, Cairo, Egypt, 2016.
4. Muhammad Najat Halla Sediqi, Teaching Islamic Economics, (Public Finance), 1st Edition, King Abdulaziz University Press, Saudi Arabia, 2016.
5. Nadia Al-Aqqoun, The Impact of Monetary Policy on Economic Growth in Algeria: An Analytical Study for the Period (0991-0010), Annals of Qalma University of Social and Human Sciences, No. 01, Qalma University, December 0102.
6. Beiton Alair, Christophe Rodriges, "Economie Monétaire, Théories Police", ARMANDCOLIN, MALAKOFF, 2017.

7. Iordachioaia Adelina-Geanina, TituMaioresou, Monetary Policy and Economie Policy, Journal of knowledge management, economies and information tecknology, volume 1, Issue no :2 university of Romania 2011.
8. Amal Maat Allah, The Effects of Fiscal Policy on Economic Growth: An Empirical Study of the Case of Algeria (1970-2012), Master's Thesis, University of Abderrahmane Belkaid, Tlemcen, 2014-2015.
9. Nadhir Yassin, The Impact of Fiscal and Monetary Policy on Unemployment in Algeria: An Empirical Analytical Study for the Period (1970-2010), Master's Thesis, University of Algiers 03, Algeria, 2012.
10. Zerouat Fatima Zohra, Mohamed Menad: "Development of Public Expenditures in Algeria and Its Impact on Economic Growth for the Period 1999-2014", Journal of Finance and Markets, 10/03/2015, Volume 02, Issue 01.
11. Nadhir Yassin, The Impact of Fiscal and Monetary Policy on Unemployment in Algeria: An Empirical Analytical Study for the Period (1970-2010), Master's Thesis, University of Algiers 03, Algeria, 2012.
12. Bank of Algeria. (2018, July). Annual Report 2017: Economic and Monetary Developments in Algeria.
13. Mohamed Bouknadel, Samia Bekadour: "The Role of Tax Revenues in Balancing the General Budget in Algeria: An Analytical Study for the Period 2010-2018", Algerian Journal of Public Finance 2170-1881 ISSN -, Volume 12 / Issue: 02, (2022).
14. M. Tenenhaus, « Statistique : Méthodes pour décrire, expliquer et prévoir », Dunod, 2007.