



Charting Economic Policy Trajectories in Algeria: An Empirical Exploration Across Global Dynamics (2000-2022)

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Abstract: *This article examines the challenges that Algerian economic policy has faced in a globalized world from 2000 to 2022 using a VAR model to identify causal relationships between different variables. The results reveal that the Economic Competitiveness Index, Foreign Direct Investments, the exchange rate, money supply, and public expenditures had a positive and significant impact on economic growth in Algeria, while public debt had a negative effect. These findings underscore the crucial importance of balanced management of various economic policy variables to achieve sustainable economic growth in Algeria. They also emphasize the need for policymakers to consider these relationships both in the short and long term when designing and implementing economic policies aimed at promoting the country's economic development.*

Key words: *Economic policy, Foreign Direct Investments, VAR model, money supply, Economic Competitiveness Index, economic growth, exchange rate, public debt.*

Jel Classification Codes: A10, B10, C20, E50.

Introduction:

Nowadays, economic policy holds a central place in macroeconomic literature. It encompasses a set of measures, decisions, and directions taken by a government or public authority with the aim of exerting influence and oversight over the economy of a given nation or region. Its primary objective generally includes achieving specific economic and social goals, maintaining economic stability, promoting growth, fostering job creation, controlling inflation, reducing poverty, encouraging investment, regulating markets, and addressing other priorities related to the economic well-being of society.

Currently, economic policy is primarily tasked with ensuring macroeconomic stability, promoting economic growth, stimulating job creation, reducing poverty and economic inequalities, and preserving financial stability in most countries.

The debates surrounding the challenges of economic policy in a globalized world are of crucial importance and are inherently complex, just like the central role they play in the Algerian economy. These discussions highlight the myriad of issues that Algeria faces in the context of economic globalization. The strategic choices made in economic policy will have a significant impact on the country's economic and social future.

In the early 2000s, Algeria initiated a phase of economic reconstruction, greatly facilitated by the rise in oil prices, owing to its position as a major player in the export of oil and natural gas. This period was characterized by macroeconomic stability supported by revenues from the oil sector, which allowed the government to bolster its foreign exchange reserves and significantly reduce its external debt, thus contributing to stabilizing the Algerian economy.

However, this period also accentuated Algeria's dependence on hydrocarbon exports, with a significant portion of government revenues coming from the oil and gas sector, making the economy vulnerable to fluctuations in global oil prices. To diversify the economy, the Algerian

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government initiated economic reforms aimed at promoting other sectors, including industry, tourism, and agriculture, although the implementation of these reforms was uneven.

Starting in 2014, the drop in oil prices had a significant impact on the Algerian economy, substantially reducing government revenues and further exposing the economy's vulnerability to oil price fluctuations. In response to this crisis, Algeria undertook budgetary reforms, including reductions in public spending and the reduction of energy subsidies, while seeking to further diversify its economy.

According to World Bank data, Algeria experienced economic growth of 1.5% in 2018, slightly higher than the previous year, with the non-hydrocarbon sector showing positive growth. However, the hydrocarbon sector contracted, partially offsetting overall growth. The COVID-19 pandemic in 2019 further impacted the economy, affecting global oil demand and supply chains. In 2021, Algeria implemented a significant monetary reform by devaluing its currency to boost exports.

In 2022, the country saw an economic recovery driven by increased oil prices. Real Gross Domestic Product (GDP) grew by 3.0%, accompanied by a refinancing program to support the government and the economy. Despite inflation rising to 9.3%, the budget deficit significantly reduced to 0.2% of GDP, thanks to higher revenues, especially from the hydrocarbon sector. The current account shifted to a surplus, and foreign exchange reserves increased.

Positive changes in human development were noted, with improvements in Algeria's ranking on the Human Development Index. Multidimensional poverty decreased, but unemployment remained high at 14.9% in 2022. To address this, the government introduced an unemployment benefit program in 2021, providing financial support to those affected.

In this context, our inquiry revolves around the following issue: What challenges does economic policy in Algeria face in a globalized world from 2000 to 2022? To address this question, we have adopted an empirical approach using VAR modeling, an econometric analysis technique that models relationships between variables using vector regression equations, taking into account variable lags and errors.

The presented model is built upon a Vector Autoregression (VAR) framework, an analytical tool in economics that captures interactions among various economic variables through simultaneous regression equations, considering feedback mechanisms for a comprehensive analysis of interdependencies. Seven key variables are integrated into the model to examine challenges in Algeria:

- a. Economic growth (GDP): Represents overall economic performance, adjusted for inflation. Factors:
- b. Money supply (M2): Influences economic activity, investments, and consumption.
- c. Public expenditures (PE): Government spending impacting various economic sectors.
- d. Exchange rate (ER): Globalization-induced fluctuations affecting exports, imports, and national competitiveness.
- e. Public debt (PD): Influences economic stability and government policies, impacting long-term growth.
- f. Economic Competitiveness Index (ECI): Measures a country's global market competitiveness.
- g. Foreign Direct Investments (FDI): Crucial for economic development, the analysis focuses on how foreign investments shape Algerian economic policy in the context of globalization.

The econometric study utilizes time series data from the Bank of Algeria and the World Bank, covering the period from 2000 to 2022, with annual data providing 23 observations for analysis. This study is organized as follows: In the first section, we will present a theoretical analysis related to economic policy and the Algerian economy. In the second section, we will introduce the econometric method for the purpose of analyzing the challenges that economic policy in Algeria has faced in a globalized world from 2000 to 2022. Finally, in the third section, we will

analyze the results of the econometric analysis using VAR modeling to illustrate the effects of economic policy on the Algerian economy during the period from 2000 to 2022.

1. A theoretical analysis concerning economic policy and the Algerian economy:

Since gaining its political independence, Algeria has witnessed a significant evolution in its economic policy, primarily focusing on two major pillars: monetary policy and fiscal policy. These two foundations have been clearly defined with the aim of pursuing essential objectives such as promoting economic growth, achieving full employment, maintaining price stability, and achieving balance of payments equilibrium. This transformation in economic policy reflects Algeria's continued commitment to achieving positive economic advancements since attaining political independence.

From 1962 to 1980, Algeria's economic policy underwent significant changes. Initially adopting a socialist state model, the country nationalized key sectors, implemented import substitution policies, and had extensive state control over the economy. The monetary policy was neutral, focusing on administrative monitoring of the money supply. The 1980s saw an economic crisis due to falling oil prices, prompting Algeria to gradually transition to economic reforms and liberalization.

In the 1990s, Algeria pursued further economic reforms, liberalization, and diversification. Measures included the enactment of Law 90-10 for financial reform, establishing the Bank of Algeria as an independent regulatory authority, stabilization and structural adjustment programs, subsidy reduction, tax reform, removal of import restrictions, and opening up to foreign investments. These changes aimed to create a business-friendly environment, promote the private sector, modernize the banking sector, and adopt a monetary policy focused on indirect instruments to control inflation and stabilize the currency.

During the 2000s, Algeria experienced a relative economic stability, primarily attributed to the increase in oil prices in international markets. During this decade, the Algerian government intensified its public investments in infrastructure and social services, thereby contributing to economic growth. However, it is important to note that despite this stability, the state maintained substantial control over many sectors of the economy, which sometimes sparked debates about the need for further liberalization of the Algerian economy (World Bank, 2021).

In the period from 2010 to 2014, the Algerian economy witnessed relatively stable growth, largely fueled by revenues from hydrocarbon production, especially oil and gas. Algeria continued to heavily rely on these resources for its budgetary revenues and exports. However, this period also witnessed certain economic challenges and vulnerabilities (International Monetary Fund, 2016).

The decline in oil prices from 2014 had a significant impact on the Algerian economy. As the primary driver of economic growth and financial stability in the country, the drop in oil prices highlighted Algeria's vulnerability to the volatility of global hydrocarbon markets. Budgetary revenues were reduced, placing increased pressure on public finances and leading to economic adjustments (Auclair, G., Jewell, A., Souissi, M., & Boukezia, R, 2017).

The Algerian government responded by seeking to diversify the economy and promote the private sector, while developing other sectors such as agriculture, manufacturing, and services. However, these diversification efforts encountered several obstacles, including structural constraints, challenges related to bureaucracy and regulation, as well as issues of economic governance (Kim, J.-K. 2013).

The table below outlines the predominant characteristics and challenges of each period, including economic stability, hydrocarbon dependence, public investments, state intervention, diversification efforts, and economic difficulties faced by Algeria during the period from 2000 to 2014.

Table 1. The predominant characteristics and challenges of each period, including economic stability, hydrocarbon dependence, public investments, state intervention, diversification efforts, and economic difficulties faced by Algeria during the period from 2000 to 2014

Period	Economic Stability	Hydrocarbon Dependency	Public Investments	State Control	Challenges and Vulnerabilities
2000s	Stability due to rising oil prices.	High reliance on oil revenue.	Increased public investments in infrastructure and social services.	State's continued control over many economic sectors.	- Debates on the need for further liberalization of the Algerian economy.
2010 - 2014	Relatively stable growth fueled by hydrocarbon revenues.	Persistence of reliance on oil and gas resources.	Continued investments in infrastructure.	State's continued economic control.	- Significant decline in oil prices from 2014. - Increased public expenditures. - Importance of oil revenue for the state budget. - Efforts to diversify the economy and promote the private sector. - Maintenance of structural and bureaucratic constraints. - Pressure on public finances and the need for economic adjustments. - Investments in education and social services. - Attempts at diversification into other sectors such as agriculture and industry. - Issues of economic governance. - Debates on the necessity of economic reforms and liberalization.

Source: Table created by the author.

Between 2016 and 2021, the oil and gas sector maintained a dominant position in the Algerian economy, contributing 19% to the Gross Domestic Product (GDP), accounting for 93% of merchandise exports, and generating 38% of budgetary revenues (World Bank, 2021). However, aware of its vulnerability to this hydrocarbon dependence, Algeria actively strives to diversify its economy. This diversification aims to broaden the range of revenue sources and improve employment prospects, especially for the youth.

The Covid-19 pandemic acted as an exacerbating factor in an already precarious economic situation. During the first half of 2020, hydrocarbon exports experienced a significant decline, with a 26% drop in oil and a 37% drop in gas compared to the same period in 2019. This

contraction led to a trade deficit and a substantial decrease in foreign exchange reserves, which decreased from \$195 billion at the end of 2013 to \$44 billion in July 2020. Even before the pandemic's impact, economic growth had already slowed, reaching 0.7% in 2019, compared to 1.4% in 2018. Furthermore, non-hydrocarbon sector growth was 2.4% in 2019, down from 3.3% in 2018. Despite concerns expressed by the International Monetary Fund (IMF), the inflation rate was controlled at 1.9% in 2019, a significant decrease from 4.2% in 2018. Forecasts for 2020 anticipated an inflation rate of 3.5% (Abdelhak, 2017).

In 2021, the Algerian economy showed a strong recovery following the challenging period caused by the pandemic. Real Gross Domestic Product (GDP) growth recorded a significant increase, reaching 3.4%, with this recovery supported by a surplus in the balance of payments and robust growth in the hydrocarbon sector (World Bank, 2022).

It is worth noting that in 2021, the unemployment rate reached 12.7% among the total active population, and this figure rose to 31.9% among youth aged 15 to 24, highlighting the persistent employment challenges faced by the Algerian youth (National Office of Statistics, 2021).

In 2022, the economic growth momentum continued in Algeria, confirming the positive trend observed in the previous year. The Gross Domestic Product (GDP) recorded a significant increase, with a growth rate of 3.2% (World Bank, 2022). This notable progression was particularly driven by the acceleration of economic activity in sectors outside of hydrocarbons, underscoring the ongoing efforts of the Algerian government to diversify its economy and reduce its dependence on oil and gas resources.

The table below provides a summary of the main economic developments in Algeria from 2016 to 2022. It highlights the crucial role of the oil and gas sector, the impacts of the COVID-19 pandemic, economic growth trends, and unemployment rates. Additionally, it underscores Algeria's ongoing efforts to diversify its economy in order to reduce its dependence on hydrocarbon resources.

Table 2. The main economic developments in Algeria from 2016 to 2022

Period	Role of the Oil and Gas Sector	Impacts of the Pandemic	Economic Growth	Unemployment Rates	Economic Diversification Measures
2016 - 2021	Dominant sector in the Algerian economy.	Significant decline in hydrocarbon exports in 2020.	Economic growth slowdown before the pandemic (0.7% in 2019).	Controlled inflation rate (1.9% in 2019).	Active efforts to diversify the economy to reduce dependence on hydrocarbons.
	Contribution to GDP: 19%.	Economic contraction in 2020.	Robust GDP growth in 2021 (3.4%).	Unemployment rate of 12.7% in 2021 (total labor force).	Promotion of non-hydrocarbon sectors, including agriculture, industry, and services.
	Goods exports: 93%.	Reduction in foreign exchange reserves (from \$195 billion to \$44 billion in July 2020).	Non-hydrocarbon sector growth of 2.4% in 2019.	Unemployment rate of 31.9% in 2021 (youth aged 15 to 24).	Reduction of subsidies for basic goods and public services.

Period	Role of the Oil and Gas Sector	Impacts of the Pandemic	Economic Growth	Unemployment Rates	Economic Diversification Measures
	Budget revenues: 38%.	-	-	-	Tax reform to increase state revenues.
		-	-	-	Removal of import restrictions to encourage competition.
		-	-	-	Opening to foreign investments and encouragement of the private sector.
2022	Continued efforts in economic diversification.	-	Significant GDP growth (3.2%).	-	Acceleration of economic activity in non-hydrocarbon sectors.
		-	-	-	Modernization of the banking sector to facilitate economic financing.

Source: Table created by the author

2. Econometric Assessment of the Challenges of Algerian Economic Policy from 2000 to 2022 in the Era of Globalization

Algeria, like many countries around the world, has faced a series of economic challenges in recent decades, especially in the context of globalization. This study aims to analyze the issues that Algerian economic policy has faced from 2000 to 2022 using econometric methods. The main objective is to examine the trends, opportunities, and obstacles that have characterized this period in order to better understand the implications of globalization on the Algerian economy. In this work, our contribution will focus on evaluating the economic policies implemented to address these challenges.

2.1. The Econometric Method Used:

The intended econometric model aims to investigate the challenges confronted by Algerian economic policy within the context of globalization from 2000 to 2022. This model is constructed based on the utilization of a VAR (Vector Autoregression) model. A VAR model is an analytical tool in economics that characterizes the interactions between various economic variables through simultaneous regression equations. In contrast to a straightforward regression model, a VAR model considers the feedback mechanisms between variables, rendering it a robust instrument for scrutinizing the interdependencies among economic variables.

To analyze these challenges, we plan to incorporate seven relevant variables into our model.

Variables to be explained:

1. Economic growth (GDP): This variable represents the overall economic performance of Algeria and is often used as a key indicator in economic studies. GDP is expressed in real terms to account for inflation.

Explanatory variables:

1. Money supply (M2): The total amount of money in circulation can influence economic activity, investments, and consumption.
2. Public expenditures (PE): Government expenditures can have a significant impact on various sectors of the economy, stimulating growth in certain cases.
3. Exchange rate (ER): In a context of globalization, fluctuations in the exchange rate can affect exports, imports, and the competitiveness of the national economy.
4. Public debt (PD): The level of public debt can influence economic stability and government policies, affecting long-term growth.
5. Economic Competitiveness Index (ECI): This index measures a country's ability to compete in global markets. A decrease in the index could indicate difficulties in maintaining a competitive position, while an improvement could signal better integration into the global economy.
6. Foreign Direct Investments (FDI): Foreign investment flows can play a crucial role in economic development. Including this variable would allow an analysis of how foreign investments have influenced Algerian economic policy in the context of globalization.

Our econometric study relies on available economic time series, including data from the Bank of Algeria and the World Bank. The estimation period covers the time range from 2000 to 2022, and it is based on annual data, providing us with a total of 23 observations for our analysis.

2.2. Model Specification:

The model specification aims to examine the impacts of the challenges that Algerian economic policy has faced in a globalized context from 2000 to 2022. After defining the explanatory variables as well as the variable to be explained in the model, we have developed an initial formulation of the mathematical form of the model, which can be written as follows:

$$\text{GDP} = F(\text{M2}, \text{PE}, \text{ER}, \text{PD}, \text{ECI}, \text{FDI})$$

Where:

- GDP: The economic growth rate.
- M2: The money supply rate.
- PE: Public expenditures.
- ER: Exchange rate.
- PD: Public debt rate.
- ECI : Economic Competitiveness Index
- FDI : Foreign Direct Investments

Once we have specified the economic function, it is necessary to convert it into an econometric model. We assume that the model takes the following form:

$$\text{GDP} = B_0 + B_1M2t + B_2PEt + B_3ERt + B_4PDt + B_4ECIt + B_4FDIt + ut$$

Where:

- t: The years from 2000 to 2023.
- ut: The error term in year t.
- B0, B1, B2, B3, B4, B5, B6: The parameters (weighting coefficients) of the econometric model.

3. Estimation Results of the Econometric Analysis with Vector Autoregressive (VAR) Modeling:

In the use of a VAR model, the first step is to study the stationarity of the data series, which aims to investigate the characteristics of the time series for all variables. In other words, it is essential to determine whether the variables are stationary or not. Therefore, the analysis of time series data is the most appropriate method for our study.

3.1. Stationarity Test:

For the variables in our model, we will use the Augmented Dickey-Fuller unit root test to test the stationarity of the model's time series. To this end, we have obtained the results shown in the following table:

Table 5. Augmented Dickey-Fuller Stationarity Test Results

	LEVEL		1st Difference	
	t-Statistic	Prob.*	t-Statistic	Prob.*
GDP	-2.114524	0.0302		
ECI	-2.141452	0.0492		
FDI	-2.149867	0.0497		
PD	-2.125488	0.0402		
M2	0.448932	0.7521	-4.431201	0.0020
PE	-1.521460	0.1123	-4.410258	0.0015
ER	-1.671452	0.1102	-4.403625	0.0009

Source: Results obtained from EVIEWS 12.0 software.

According to the presented table, we can observe that the critical probability values for the variables M2, PE, and ER are all greater than 0.05. Therefore, we do not reject the null hypothesis H0, suggesting that these variables have unit roots and are non-stationary.

However, for the variables GDP, ECI, FDI and PD, the critical probability values are less than 0.05. Consequently, we reject the null hypothesis H0 for these variables, indicating that they do not have unit roots and are stationary.

Furthermore, it is important to note that the variables M2, PE, and ER become stationary after the first difference, as the critical probabilities are all less than 0.05, leading us to reject the null hypothesis H0. Therefore, these variables are stationary at order 1.

In summary, the results of the ADF test indicate that the variables M2, PE, and ER are non-stationary in level but become stationary after the first difference, i.e., they are stationary at order 1. On the other hand, the variables GDP, ECI, FDI and PD are stationary in level, meaning they are stationary at order 0.

3.2. Johansen Cointegration Test:

In our study, while analyzing the stationarity of the series in our model, we observed that these series do not have the same order of integration. Specifically, the M2, PE, and ER series are of order one, meaning they are integrated at order 1 (1), which implies that they require differencing of order 1 to become stationary. On the other hand, the GDP, ECI, FDI and PD variables are of order zero, meaning they are integrated at order 0 (0), indicating that they are stationary without requiring differencing.

Therefore, these results suggest that the variables in our empirical model do not share the same order of integration. Consequently, we conclude that there is no Granger-causal cointegration relationship between these variables. Therefore, it is not appropriate to construct a Vector Error Correction Model (VECM) in this context. Instead, the Vector Autoregressive Model (VAR) will be used as the analysis model to better understand the relationships between these variables.

3.3.Determination of the Optimal Number of Lags:

The following table provides the values of the two criteria after estimating the models up to lag order 2:

Table 6: Determination of the Optimal Number of Lags

VAR Lag Order Selection Criteria

Endogenous variables: GDP D(ER) D(M2) PD D(PE) ECI FDI

Exogenous variables: C

Date: 01/12/24 Time: 15:35

Sample: 2000 2022

Included observations: 22

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-295.8199	NA	518239.4	27.34726	27.59523*	27.40568
1	-224.6228	38.49956*	123491.7*	25.42025*	28.14786	26.06280*
2	-263.1223	47.56009	276207.3	26.64749	28.13527	26.99796

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: Results obtained from EVIEWS 8.0 software.

According to the results obtained, we can say that the number of lags retained corresponds to the lowest value of the criteria, which is $p^* = 1$, meaning a lag of one year. Therefore, the challenges facing economic policy in Algeria in a globalized world from 2000 to 2022 are only visible after one year.

3.4.Vector Autoregressive (VAR) Modeling

Vector Autoregressive (VAR) models are a widely used statistical methodology in time series analysis. In our study, since the following time series, namely GDP, PD, ECI, FDI, D(M2), D(PE), and D(ER), are stationary, it is possible to model them using the VAR method.

The table below, obtained using EvIEWS 12, presents the results of the estimation of the VAR(1) modeling of the variables used in our model. Specifically, the modeled equation is as follows:

$$\Delta GDP_t = \alpha_0 + \beta_1 \Delta GDP_{t-1} + \beta_2 \Delta PD_{t-1} + \beta_3 \Delta ECI_{t-1} + \beta_4 \Delta FDI_{t-1} + \beta_5 \Delta D(M2)_{t-1} + \beta_6 \Delta D(PE)_{t-1} + \beta_7 \Delta D(ER)_{t-1} + \varepsilon_t$$

where:

- Δ represents the first difference of the variable,
- GDP_t is the economic growth (Gross Domestic Product) at time t ,
- PD_t is the public debt at time t ,
- ECI_t is the Economic Competitiveness Index at time t ,
- FDI_t is the Foreign Direct Investment at time t ,
- $D(M2)_t$ is the first difference of the money supply at time t ,
- $D(PE)_t$ is the first difference of public expenditures at time t ,
- $D(ER)_t$ is the first difference of the exchange rate at time t ,
- α_0 is the intercept term,
- $\beta_1, \beta_2, \dots, \beta_7$ are the coefficients associated with the lagged first differences of the respective variables,
- ε_t is the error term at time t .

This model captures the dynamic relationships between economic growth and the selected variables, taking into account the lagged differences in each variable to analyze their interdependencies over time. The coefficients $\beta_1, \beta_2, \dots, \beta_7$ quantify the impact of the lagged

changes in each variable on the current economic growth.

The results of our estimation can be expressed through the following equation:

$$\text{GDP} = 0,71 * \text{GDP}(-1) + 0,11 * \text{D}(\text{ER}(-1)) + 0,21 * \text{D}(\text{M2}(-1)) - 1,47 \text{PD} + 0,45 * \text{D}(\text{PE}(-1)) + 0,27 * \text{D}(\text{ECI}(-1)) + 0,70 \text{FDI}$$

R-squared 0.91 Adj. R-squared 0.86 F-statistic 28.45

Table 7: Impact of Variables on Economic Growth (GDP)

Variable	Impact	Prob.*
PD	Negative Effect	0.0120
ECI	Positive Effect	0.0115
FDI	Positive Effect	0.0209
ΔM2	Positive Effect	0.0145
ΔPE	Positive Effect	0.0412
ΔER	Positive Effect	0.0910

3.5. Model Validation:

To better understand the results of the VAR(1) model, it is essential to assess its econometric robustness. Several tests are available to evaluate the validity of a VAR model.

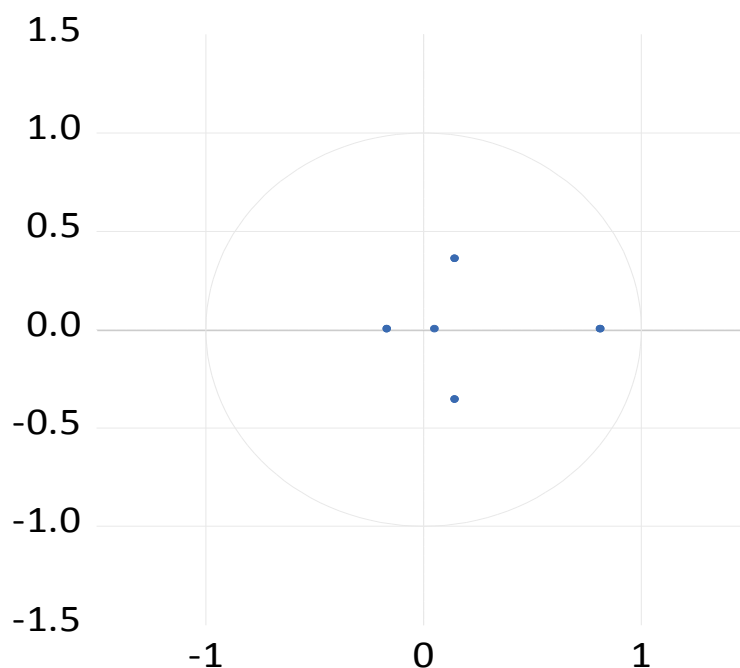
In this regard, we will implement two specific tests: the stationarity test of the VAR model and the normality test.

3.5.1. Stationarity of the VAR(1) model:

We will verify the stationarity of the model using the inverse of the characteristic polynomial roots test. In this case, all roots must lie inside the circle.

Table 8. VAR (1) Stationarity Test

Inverse Roots of AR Characteristic Polynomial



Source: Created by the author using EVIEWS 12 software.

We observe that all eigenvalues are located inside the unit circle. Therefore, the VAR(1) model is stationary.

3.5.2. Jarque-Bera Normality Test

The Jarque-Bera test is a statistical test used to assess whether a distribution follows a

normal distribution. When the Jarque-Bera probability is less than 5%, it leads to the rejection of the null hypothesis that the distribution is normal. Conversely, if the probability is greater than 5%, the null hypothesis of a normal distribution is accepted. The results of this test are presented in the following table.

Table 9. Normality Test

Component	Jarque-Bera	df	Prob.
1	0.145874	2	0.9752
2	0.145244	2	0.7145
3	0.145254	2	0.8145
4	0.321458	2	0.8610
5	0.298745	2	0.8741

Source: Conducted by the author using EViews 12 software.

The results of this test reveal that the probability (P-value) for our model is 0.8811, which is greater than 5%. This indicates that the variables in our model follow a normal distribution. The tests conducted indicate that the VAR(1) model is stationary, stable, and the variables follow a normal distribution. Therefore, from an econometric perspective, we can conclude that our VAR(1) model is valid.

4. Model Significance:

The coefficient of determination (R²) for our model is 0.91, suggesting that the model successfully explains approximately 91% of the total variability present in the dataset. In simpler terms, 91% of the fluctuations observed in the dependent variable, which is the Gross Domestic Product (GDP), can be attributed to the influence of the independent variables incorporated into the model. This high R² value indicates a strong relationship between the chosen independent variables and the GDP, affirming the model's ability to capture and account for the majority of the variability in economic growth.

Furthermore, the adjusted R² (Adj. R²) stands at 0.86. Unlike the regular R², the adjusted R² considers the number of explanatory variables in the model. It serves to refine the R², preventing potential overestimation of the model's goodness of fit. With an Adj. R² of 0.86, we find that the model maintains a robust fit even when adjusting for the added complexity introduced by the explanatory variables. This indicates that the chosen independent variables contribute meaningfully to explaining the variations in GDP, and the model remains effective in its predictive capacity.

In addition to the R² and adjusted R², the F-statistic of the equation also holds significance. The F-statistic value surpasses the critical F-statistic in the table, signaling that our model is globally significant. This implies that, as a whole, the independent variables jointly contribute to the explanation of the dependent variable (GDP), reinforcing the overall validity and reliability of our econometric model.

5. Economic Interpretation:

The analysis of our VAR(1) model reveals that the economic growth equation has overall significance. Indeed, the coefficient of determination (R-squared) is 0.91, indicating that this equation can explain 91% of the variation in economic growth. Furthermore, the VAR(1) model for the GDP equation shows statistical significance, as evidenced by the F-statistic (F-statistic = 28.45 > critical F-statistic at 5% in the table). Therefore, we can conclude that our model is globally significant.

Certainly, let's interpret the coefficients of the variables in the given equation:

$$\text{GDP} = 0.71 \times \text{GDP}(-1) + 0.11 \times \Delta(\text{ER}(-1)) + 0.21 \times \Delta(\text{M2}(-1)) - 1.47 \times \text{PD} + 0.45 \times \Delta(\text{PE}(-1)) + 0.27 \times \Delta(\text{ECI}(-1)) + 0.70 \times \text{FDI}$$

1. GDP (lagged):

- Coefficient: 0.71
- Interpretation: A one-unit increase in the lagged GDP is associated with a 0.71-

unit increase in the current GDP. This suggests a positive correlation, indicating a momentum effect where the past GDP influences the present GDP positively.

2. $\Delta(ER(-1))\Delta(ER(-1))$ (Lagged Change in Exchange Rate):

- Coefficient: 0.11
- Interpretation: A one-unit increase in the lagged change in the exchange rate is associated with a 0.11-unit increase in the current GDP. This implies that changes in the exchange rate have a positive impact on the current GDP.

3. $\Delta(M2(-1))\Delta(M2(-1))$ (Lagged Change in Money Supply):

- Coefficient: 0.21
- Interpretation: A one-unit increase in the lagged change in money supply is associated with a 0.21-unit increase in the current GDP. This suggests that changes in the money supply positively influence the current GDP.

4. PD (Public Debt):

- Coefficient: -1.47
- Interpretation: A one-unit increase in public debt is associated with a 1.47-unit decrease in the current GDP. This indicates a negative impact of public debt on economic growth.

5. $\Delta(PE(-1))\Delta(PE(-1))$ (Lagged Change in Public Expenditure):

- Coefficient: 0.45
- Interpretation: A one-unit increase in the lagged change in public expenditure is associated with a 0.45-unit increase in the current GDP. This suggests that changes in public expenditure positively affect the current GDP.

6. $\Delta(ECI(-1))\Delta(ECI(-1))$ (Lagged Change in Economic Competitiveness Index):

- Coefficient: 0.27
- Interpretation: A one-unit increase in the lagged change in the economic competitiveness index is associated with a 0.27-unit increase in the current GDP. This implies that improvements in economic competitiveness positively impact the current GDP.

7. FDI (Foreign Direct Investment):

- Coefficient: 0.70
- Interpretation: A one-unit increase in foreign direct investment is associated with a 0.70-unit increase in the current GDP. This indicates a positive relationship, suggesting that higher levels of foreign direct investment contribute positively to economic growth.

In summary, according to this theoretical interpretation, the model suggests that economic growth (GDP) is influenced by various factors, including the lagged GDP, changes in exchange rate, changes in money supply, public debt, changes in public expenditure, changes in the economic competitiveness index, and foreign direct investment.

The presented econometric model provides intriguing insights into potential determinants of economic growth, measured by Gross Domestic Product (GDP). According to the estimated coefficients, several factors play a significant role in explaining variations in GDP. The positive coefficient associated with lagged GDP suggests the existence of economic inertia, where past economic trends continue to positively influence current growth. Favorable changes in the exchange rate and money supply also appear to contribute positively to GDP, reflecting theories related to competitive advantages in international markets and the stimulating impact of monetary expansion on the economy. Conversely, public debt exhibits a negative relationship with GDP, confirming concerns about its potentially restrictive impact on growth. Changes in public expenditure, according to Keynesian theory, show a positive correlation, suggesting that targeted increases can stimulate economic activity. Similarly, improvements in the Economic Competitiveness Index and higher levels of Foreign Direct Investment (FDI) are associated with stronger economic growth. In summary, this model highlights the importance of various factors

in determining economic growth, providing relevant insights for economic policies and decision-makers.

6. Granger Causality Test:

The Granger causality test allows us to determine statistically significant influences of variables in the model on each other. In other words, it examines the causal relationships between these variables, helping us identify which variable exerts influence on another.

To be more precise, according to the Granger approach, a variable is considered the cause of another if knowledge of its past improves the ability to forecast the second variable. Two major tests have been developed for this purpose: the Granger test (1969) and the Sims test (1980). In the context of this study, we chose to use the Granger test to determine the direction of causality among the variables under examination.

The following table represents the results of the Granger causality test:

Table 10. Granger Causality Test

Causal Variable	Affected Variable	Granger Causality	Probability
M2	GDP	Yes	0.03
PE	GDP	Yes	0.01
ER	GDP	Yes	0.00
PD	GDP	Yes	0.01
ECI	GDP	Yes	0.03
FDI	GDP	Yes	0.02

Source: Results obtained from EVIEWS 8.0 software.

During the analysis of causality tests among different data series, the following results were obtained: the variables M2 (Money Supply), PE (Government Expenditure), ER (Exchange Rate), ECI, FDI and PD (Public Debt Rate) are causal factors for GDP (economic growth). The hypothesis that these variables do not Granger-cause GDP is rejected at the 5% significance level. The associated probabilities for these results are 0.03, 0.01, 0.01, 0.03, 0.02 and 0.01, which means they are below the statistical threshold of 5%. This indicates that M2, PE, ER, ECI, FDI and PD Granger-cause GDP, suggesting a one-way causality relationship from these variables to economic growth.

Conclusion

The objective of this study was to examine the challenges facing economic policy in Algeria in a globalized world from 2000 to 2022, using a VAR model to identify causal relationships between different variables.

The results obtained provide crucial insights. They indicate that the money supply and government expenditures had a positive and statistically significant impact on economic growth in Algeria. In contrast, the exchange rate and the level of public debt had a negative effect on this growth. These findings highlight the imperative need for a balanced management of various components of economic policy to promote sustained economic growth in Algeria.

Furthermore, these results underscore the importance for policymakers to take into account these relationships in both the short and long term when formulating and implementing economic policies aimed at stimulating the country's economic development. It is clear that informed and strategic decisions are essential to overcome challenges and seize opportunities in the context of globalization, and these results provide a solid foundation for guiding future policy choices in Algeria.

Bibliography List:

1. Auclair, G., Jewell, A., Souissi, M., & Boukezia, R. (2017). Prepared By Greg Auclair, Andrew Jewell, Moez Souissi (all MCD), and Racheeda Boukezia (FAD). The Middle East and Central Asia Department. International Monetary Fund. Washington, D.C.: Publication Services, International Monetary Fund. May 15, 2017.
2. Bank for International Settlements. (2015). Central Bank Papers on Monetary Policy Frameworks in the Arab Countries. In AMF-BIS Working Party Meeting on Monetary Policy in the Arab Region, Abu Dhabi - United Arab Emirates, 25-26th, November 2015.
3. Begga, C. (2014). Attempts to Industrial Reforms in Algeria: Do they fit the Logic of Globalization? *Topics in Middle Eastern and African Economies*, 16(1), 96.
4. J. Thomson et A. Rayner, quantitative policy modelling in agricultural economics, 1984, Citer par V. Massow, les importations laitières en Afrique subsaharienne: problèmes, politiques, et perspectives, ILRI (aka ILCA et ILRAD), Cipea, Rapport de recherche n 17, 1990.p 57.
5. International Monetary Fund. Middle East and Central Asia Dept. (2016). Algeria: Selected Issues. Volume 2016: Issue 128. International Monetary Fund. ISBN: 9781484358351. ISSN: 1934-7685. DOI: <https://doi.org/10.5089/978>.
6. International Monetary Fund. (2016). IMF Country Report No. 16/128. Washington, D.C.: Publication Services, International Monetary Fund. The Middle East and Central Asia Department.
7. Kim, J.-K. (2013). Establishment of Algeria's National Vision 2030. MINISTRY OF STRATEGY AND FINANCE, Korea Development Institute.
8. Laframboise, N., Alonso-Gamo, P., Feler, A., Bazzoni, S., Nashashibi, K. A., & Horvitz, S. P. (1998). Algeria Stabilization and Transition to Market. International Monetary Fund. DOI: <https://doi.org/10.5089/9781557756916.084>
9. M. Burda et C. Wyplosz, « macroéconomie à l'échelle européenne », édition De Boeck, Belgique, 2006, p 612.
10. J Deiss et P Gugler, « politique économique et sociale », édition de Boeck, Belgique, 2012.
11. M Delaplace, « monnaie et financement de l'économie », édition Dunod, Paris, 2009
12. MENA (2020), «Algérie : rapport de suivi de la situation économique», <http://www.banquemondiale.org> (consulté le 20/02/2020).
13. Le Vecteur Autoregressif (VAR) est un modèle statistique développé par Christopher Sims au début des années 1980 qui permet de capturer les interdépendances entre plusieurs séries temporelles.
14. Naas A, « Le Système Bancaire Algérien », édition Maisonneuve et Larose, Paris, 2003.
15. Bernard Chavance (2019), « La planification centrale et ses alternatives dans l'expérience des économies socialistes », presses Universitaires de France, France, p26.
16. Abadli R, « Processus d'ouverture de l'économie algérienne, vingt ans de transition. Evolution et performance », thèse pour obtenir le grade de docteur de l'université de Paris8 Vincennes Saint-Denis, France, 2011.
17. Abbas A, « efficacité et limites de la politique économique et conjoncture dans un modèle de type « mindel- Fleming » étude économétrique sur l'Algérie », thèse pour le doctorat en sciences économiques, université de Tlemcen, Algérie, 2014-2015.
18. AOUDIA Kahina. (2017), « Efficacité de la politique monétaire en Algérie (1990 – 2017) », revue univ Alger 3, numéro 9, p1.
19. Achour Y, « L'analyse de la croissance économique en Algérie », thèse de doctorat en sciences économique option : finances publiques, université de Tlemcen, Algérie, 2014.
20. Rapport de la banque d'Algérie, 2010.
21. Rapport de la banque d'Algérie, 2018.
22. Rapport de la banque d'Algérie, 2019.
23. Rapport de la banque d'Algérie, 2012.
24. Office national des statistiques, 2020.