

**The effectiveness of the economic diversification policy, the case of Algeria:  
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**Abstract:**

The primary purpose of this study is to analyze the impact of economic diversification, represented by the agriculture, industry, and services sectors, on economic growth in Algeria during the period of 2000-2019. To test the hypotheses, data covering this period were collected from multiple databases, including the National Office of Statistics (ONS), World Bank, and Bank of Algeria, and analyzed using an econometric model that included joint integration and stability tests. The results of the analysis suggest that there is a short-term relationship between the growth of GDP and the determinants of economic diversification represented by the agricultural, industrial, and service sectors.

**Keywords:** Economic diversification, Oil rent, Econometric model, Economic growth, Algeria.**JEL Classification:** E60·E69· H55· H89

## 1. Introduction:

The phenomenon of economic diversification occupies a significant place in rentier economies that depend on a single source of revenue, typically from exporting a single product. Relying on a single resource for economic growth poses a threat to the country's economy in all respects, as it does not guarantee sustained economic growth and development. This is particularly true in light of the economic and financial changes and fluctuations that the world is experiencing in the new millennium resulting from globalization, technological development, and intellectual creativity (Siegel PB, Alwang J, and Johnson TG, 1995). Primary resources and underground wealth can be a double-edged sword since they can be a blessing or a curse depending on their price in global markets. A robust and effective strategy for economic development is therefore essential (McLaughlin GE, 1930).

Algeria is considered one of the rentier countries that rely heavily on a single resource in its economy, namely oil, which represents 97% of its exports abroad. The Algerian economy is directly affected by oil prices in world markets, and any collapse or fluctuation in prices has a significant negative impact. Therefore, the Algerian government, particularly after the oil crisis of 1986, has had to reconsider its development policies and find other alternative resources and strategies to diversify the Algerian economy (Benachenhou, A,1992). Many countries, including Malaysia, Qatar, Saudi Arabia, and others, have encouraged other sectors such as agriculture, industry, and services, which are no less critical than the hydrocarbon sector.

From this standpoint, the following central question arises:

### **-How effective is the economic diversification policy in Algeria?**

#### **Study hypotheses:**

- There is a positive relationship between sectors outside of hydrocarbons and economic growth.
- There is an inverse relationship between the agricultural sector and economic growth.
- Economic diversification is ineffective in the Algerian economy.

#### **Study methodology:**

To answer the research questions and test the assumptions, we used an inductive approach, drawing from books, research papers, studies, and websites. We also used appropriate econometric methods to analyze time series data using the EVIEWS 10 statistical program.

#### **Objectives and importance of the study:**

The contribution of our work must be understood based on the following elements. Firstly, little research has been conducted on the theme of economic diversification, and thus we aim to make our modest contribution in this area through our study. Secondly, the debate on this issue is relatively recent and has gained significance following the oil crisis of 2014, which compelled the Algerian government to explore alternatives to oil. Thirdly, we aim to emphasize the economic potential of a policy of economic diversification through the following objectives:

- Clarifying the objectives and directions of Algeria's economic diversification policy, and assessing its effectiveness in practice to underscore its fundamental importance.

-Conducting an econometric study to evaluate the policy's effectiveness by measuring the non-oil sectors' contribution to GDP and economic growth in numerical terms.

-Analyzing the current state of economic diversification in Algeria to shed light on the reality of the situation- Highlighting and analysing the reality of economic diversification in Algeria.

### **Study limits:**

Our study will focus on analyzing and evaluating the effectiveness of the economic diversification policy in non-oil sectors (agriculture, industry, and services) and their contribution to Algeria's economy during the period of 2000-2019. This period is significant as it marks the beginning of the new millennium, and experienced relative stability in various aspects such as security and politics. Furthermore, this period saw the global financial crisis of 2008 and the collapse of oil prices in 2014. Our study's spatial framework is Algeria, which is among the primary rentier countries.

### **Study structure:**

Section 1 will provide a brief overview of economic diversification. In Section 2, we will review relevant academic literature. Section 3 will describe the data used in our study, followed by a detailed description of our econometric model in Section 4. Section 5 will discuss the results, and Section 6 will conclude the study.

## **2. Definition and origin of economic diversification:**

To deeply analyze the concept of economic diversification, we should focus on many of its various aspects by describing the notion as sharp as possible (definitions, origins, goals.....).

### **2.1. Definition of economic diversification:**

The economic literature encompasses a range of definitions of economic diversification. Most studies in this field consider several vital aspects. For this reason, it is essential to clarify how the term is used or understood in some of the writings before discussing the relevance of this notion for emerged developed countries like Algeria.

- First of all, we can define economic diversification in general terms. It merely means for many authors, the process of structural transformation as resources are shifted out of primary (natural resource-based) sectors into secondary (manufacturing), and tertiary (service) sectors. This action's objective is to vary country's sources of economic growth and income in such a way that the country becomes more or less equally dependent on all sectors of the economy. (Botswana, G. o, 2011).

-View under another angle, economic diversification refers to “a process of broadening the range of economic activities in the production and distribution of goods and services. It does not necessarily entail an increase in output, but it enhances the stabilization of economies by diversifying their economic base”. (Usman, Z, 2017).

-Another definition, according to the Routledge Encyclopedia, economic diversification aims at achieving two goals: a raising of exports products and a reduction of imports products from abroad to avoid the adverse effects of economic globalization.

These general definitions beyond if it gives us an insight into economic diversification do not allow us to explore seriously the impact of this notion on the challenge of economic development that faces many developing countries, especially oil countries.

In effect, what we notice across the world is that the international environment has changed profoundly, creating new challenges and opportunities in developing countries. This latter appears in the transformation of the production process of economic activities based on the principle of flexibility to face to new technology or market signals. (Pingali et al, 1995).

This means that the concept of economic diversification refers to some relevant approaches that give a new comprehension of this term relative to economic growth and development. That is why we will link economic diversification with other aspects related to various economic, social, political, and institutional factors.

To achieve this goal, introducing innovative products on the market's exports and establishing the flexibility and capacity to continually adapt products and processes of production to continuously evolving circumstances lead to increase in the share of goods and services and to help for a new environment favorable for investment and a reduction of extern shocks. This form of development can permit to strengthen sustainable growth by managing resources, technology, and entrepreneurship (Barghouti, 2004).

We can summarize what has been said above about the meaning of the concept of economic diversification is that from a conceptual point of view, the term is inclusive and refers mainly to three elements (reduction of dependence, multiplication of export products, and increase in the share of industrial autonomy ).

In this respect, diversification as policy constitutes an outstanding instrument to integrate the process of structural change in the global production network and offers a unique opportunity to developing countries to gain some benefits from international trade.

In most developing countries, economic diversification is seen as a strategy to implement many economic reforms aiming principally to break the dependence from a single source of income. This is the case of the oil countries looking for multiple sources to strengthen their economies outside the oil.

Given all of these advantages, the process of economic diversification is widely considered one of the pathways out of the "resource curse" for developing countries abundant in natural resources (Humphreys, Sachs and Stiglitz, 2007; Gelb, 2010). In this order, each government seeks to broke the circle of dependency and aims to develop his diversified economy by setting strategies to reach a sustained economic condition.

After an overview of the definitions of economic diversification, the following point will highlight the contribution of economic thought to the emerging concept of economic diversification.

## **2.2.Origine and evolution of economic diversification:**

The topic of economic diversification has been a central point in economic thought from the classical authors to the present. Several lines of research can be traced back to Adam Smith, Karl Marx, and Joseph Schumpeter, giving different explanations for why economies grow and diversify their economic activities over time. For example, Joseph Schumpeter (1912) considered economic development a structural transformation process in which innovation leads to the emergence of new sectors and the obsolescence of some old sectors, a phenomenon that he termed 'creative destruction.

Though, this question has captured more attention of authors in the earlier twenties, precisely during the advent of the crisis of the 1930s. The first work carried out in this field is attributed to Mac Laughlin. Other authors like Lewis, Rosenstein, and Rodan, De bernis... have prolonged the research by focusing their attention on some aspects of economic diversification. We can mention the question of import-subsisting, the build of a productive national system...

Afterward, work on this subject will experience rapid development in the 1940s and 1950s and will constitute the dominant paradigm of thinking about growth and development until the late 1970s. Indeed, this issue of diversification was at the center of early work on economic development. It was at the origin of elaborating a series of choices in terms of development strategy and, more particularly, of the import-substitution strategies implemented by most developing countries in the 1960s and 1970s.

Besides, this research has generated a series of analytical works to define the tools capable of measuring diversification efforts and progress, such as input-output matrices, and sought to identify the factors at the heart of the diversification process and focused on investment, sectoral policies, and more particularly the industrial development. However, the crisis of the late 1970s and the failure of import substitution strategies reoriented thinking about diversification.

Given all these considerations and to explain more points, we begin by giving an overview of the emergence of the notion of economic diversification through economic history. We are not going to study the contributors exhaustively to this field, but just citing some authors that appear to us relevant by their ideas to clarify the economic diversification notion in economic thought.

**2.2.1. Contribution of Mac Laughlin:** As it is said earlier, Mac Laughlin was among the first economist who expressed the basic ideas on economic diversification. He tried to explain the economic cycles in American cities according to the degree of concentration of economic activities. (McLaughlin GE, 1930)

**2.2.2. Contribution of Rosenstein and Rodan:** Also, research in the field of economic diversification witnessed rapid development during the years 1940, 1950, where the problem of economic diversification was related to the terms of economic. Economists in this field: - Rosenstein and Rodan economists tackled the topics of the effect of education and the intensity of a matrix between sectors. (Rosenstein-Rodan, P.M, 1943).

**2.2.3. Contribution of Gerard De Bernis:** For economist De Bernis economic diversification passes through the manufacturing process, known as the manufacturing industries. It is inspired by the idea of the growth pole presented by Francois Perroux, which relates to creating a harmonious industrial structure, which requires creating a harmonious industrial structure, which means that various Sectors are intertwined with each other in terms of inputs and outputs, which necessitates the existence of production sectors for equipment and intermediate goods destined for internal production-consumption. (De Bernis G. D, 1966).

**2.2.4. Contribution of Kuznets and Rostow:** On their reflections on the process of economic development, Kuznets and Rostow made the following observation on the economic relations between developing and developed countries: the periphery of the world economy was considered to attend to the demand for primary products of the dynamic and diversifying

centers of development and suggested that structural change in the economy and economic diversification is necessary to pass into growth and development. (Rosenstein-Rodan, 1943; Nurkse, 1953; Lewis, 1954; Hirschman, 1958).

**2.2.5. Contribution of Arthur Lewis:** For Lewis a famous economist of the economic theory of development, the economic crisis that rocked the global economy in the late 1970s and the failure of the import substitution policy, was the reason for the marginalization of the idea of economic diversification, that is why he proposed to rise both investment capacity and national accumulation as a key factor in diversifying the economic structure and moving from the traditional economy to modern economy. (Lewis A.W, 1954,1982).

**2.2.6. Contribution of Porter, Becattini, Pyke:** Economic diversification can be viewed from economic geography. For example, Jane Jacobs (1969) considers that cities' growth led to a variety of activities as a source of income, employment, innovation, and technology. In that vein, research in this field highlights the importance of proactive specialization and geographic agglomeration of related activities and firms. (Becattini, 1979; Pyke et al., 1990; Porter, 1990, 1998; Glaeser et al., 1992).

The conclusion drawn from the variety of ideas presented is that macroeconomic stabilization and international specialization have become the significant themes of reflection and development policies where the question on economic diversification is central in these thinking. More addition, the debate on diversification is seen as a crucial component of economic growth linked tightly to the products a country produces.

### **2.3. The theories of economics diversification:**

Following on from what was discussed earlier, this section examines the various theories that relate to the concept of economic diversification, namely: industrial organization theory, economic base theory, regional business cycle theory, trade theory, portfolio theory, theories of localization and regional economics, and economic development theory. These theories have been used to build economic models that accompany economic diversification policies. The main aspects of these theories will be presented to show both the complexity and the richness of the subject.

**2.3.1. Industrial organization theory :** In studies on industrial organizations, the notion of concentration measures gives us insight into the country's industrial depth. In effect, concentration measures take a large part to assess the existence of firm domination. Thus, we know that a more diversified and less busy and concentrated sector gives us a competitive and preferred sector. The more we have several sectors and a fair distribution that guarantees us equality in economic activity. This process is always related to economic diversification, McLaughlin (1930) and Tress (1938) .

**2.3.2. Economic base theory:** This theory is based on regional growth driven by exogenous final demands (export). Input-output models are the extension of models at the intersectoral economic basis that explicitly taken into account. We have seen that (we have known that) hypothesis was that final exogenous demands link the regional economy, (Isard 1976, p.252).

**2.3.3. Regional business cycle theory:** The study of regional economic instability resulting from national business cycles draws heavily on economic base theory (Domazlicky 1980, p.15). The cause of economic instability in a region refers to the fluctuation in demand for its

exports and according to Vining (1946) the high levels of economic uncertainty it explains concerning high-income elasticity of short-term demand for exports of a region, and for this, it was put forward the following hypothesis that the regional differences in economic stability can be explained by the combination of a region of the stable and unstable sector and to test this relationship a part of a region in one of the stable or non-stable sectors was used as a measure of economic diversification.

**2.3.4.Trade theory:** According to trade theory, the exchange is based on regional differences in endowments and preferences, and specialization in production according to comparative advantage. This theory predicts that economic specialization will lead to economic growth. The Regional endowments vary concerning natural resources, human resources, technological resources, spatial attributes, and infrastructure. Moreover, the Institutional factors that influence

regional comparative advantage are zoning ordinances, tax rates, environmental regulations, education, and labor laws.

**2.3.5.Portfolio theory :** The portfolio theory has initially been applied to financial assets. Using the mean return as a proxy for expected returns (E) and the variance (V) as a proxy for risk, the Markowitz (1959) portfolio method determines the set of mean-variance (E-V) efficient portfolios. Conroy (1974, 1975) proposed a theoretical approach to the portfolio of economic diversification. For him, each sector is characterized as an individual investment.

**2.3.6.Location and regional economic theories:** Location theory examines the spatial distribution of economic activity. One characteristic of economic activities is their tendency to occur in spatial clusters. The lower cost of production resulting from agglomeration economics is a vital cause of specialization and regional competitive advantage (Hoover and Giarratani, 1985). (Harmston, 1983)

**2.3.7.Economic development :** The process of structural transformation is fundamental to economic development (Syrquin, 1988). The process of economic diversification will be achieved if developing countries can produce changes in production patterns, consumption patterns, and trade patterns. This vision may be concretized by unbalanced growth that fosters policies of high-income elasticities of demand. Here, it is noteworthy to observe that this process of economic diversification is based on the principle of adjustment structural of activities to face volatility of international markets. In this context, unbalanced growth can lead to either a more or less balanced economic structure. By giving some of the views about economic diversification policies through economic literature devoted to this topic, it is clear to observe that there is no consensus for achieving diversification. Enhancing the process of economic diversification is a long term objective, especially for developing countries that they owe learning how to develop their local potentialities among factors such as human capital and natural resources.

The main conclusion of this part is that economic diversification matter and constitute a significant goal for many countries, especially developing countries. Economic theories devoted to this problem shows that adequate economic diversification depends on various factors: economic, social, political, and institutional. Studies in this field establish the link between growth stability and development with a certain level of economic diversification, which positively impacts the fluctuation of prices and production.

### 3. Empirical studies :

This part will deal with a presentation of the essential previous research and studies that include the objectives, the sample, the study tools, and the most noticeable results.

The empirical literature on developed countries on the issue of economic diversification is pervasive and has addressed different aspects of economic diversification. We can mention trade specialization, production process. However, we have selected only a few studies that we consider to be the most significant for our work.

On the relationship between international trade and economic diversification, **Jean Claude Barthelemy,(2005)** discusses the arguments in favor of economic diversification policies and revisits the analysis of the gains of diversification in the light of new trade theory analyses. His study is based on an econometric framework, economic diversification index (Herfindahl·Entropy·G5·Intrabrand), and covers forty-one developed, emerging, and transition economies. (Australia, Italy, South Africa, Austria, Japan, Argentina, Belgium, Norway, Brazil, Canada, Mexico, Chile, Korea, New Zealand, China, Denmark, Netherlands, Colombia, Spain, Poland, India, United States, Portugal, Israel, Finland, Czech Republic, Malaysia, France, United Kingdom, Pakistan, Greece, Sweden, Philippines, Hungary, Switzerland, Singapore, Ireland, Turkey, Thailand, Tunisia) from 1985 to 1999.

The study's initial results are that economic diversification is linked to new forms of trade specialization: intra-industry trade and the international segmentation of production processes. Instead of being associated with protectionism, a successful diversification policy must be based on active participation in globalization. This research recommends a successful diversification policy to avoid any protectionism and suggests an integration in globalisation.

The economic literature on oil countries is critical in recent years. Most studies in this field investigated how oil countries would break oil dependency and diversify their economy to ensure growth and stability for continuing development. The results are different following the experience of each economy as we are going to see it.

In this order, we have the study of **Maatallah ( 2020)** that tests the impact of oil rents on economic growth and examines the resource curse phenomenon's main symptoms in oil-abundant MENA countries. Using pooled OLS, fixed effects, random effects, and generalized method of moments (GMM) estimators, the author conducts a study based on a sample of 11 Mena countries (Algeria, Bahrain, Iran, Iraq, Kuwait, Libya, Oman, Qatar, Saudi Arabia, United Arab Emirates, and Yemen )

Over the period 1996-2017. The main findings indicate that oil rents significantly and positively influence MENA oil exporter's growth.

Indeed, these economies are marked by the so-called resource curse. In this regard, the question of governance is posed crucially in these countries. The absence of this element inhibits any policy toward economic diversification as it is showed in the study. Instead, that has encouraged rent- seeking activities. When it considers the interaction between governance index and oil rents, the effect of this combination is positive in promoting diversification.

Hence, the presence of better governance in MENA oil-exporters might diminish surely the dependency of these economies on the oil and help them to transform oil wealth on a tool to

implement a process of economic diversification and ensure them sustainable economic growth.

About Algerian economic writings in this area, most authors notice the weak of the structural economy to achieve economic diversification. For example, the study of **Nadjet Kurtel (2019)** devoted to this subject and aimed to shed some light on the economic diversification trajectory in Algeria during the period 2011-2017, conclude that it is imperative to adopt economic diversification as a new development policy aiming at achieving the gradual transition of the Algerian economy from concentration to diversification, in order to create new sources of income.

On another level, and in a comparative study between Algeria, Indonesia, Malaysia, Chile, Mexico, and Norway, the research conducted by **Houari Ahlam and Seddi Ali (2019)** presents some successful export diversification experiences by using an analytical study of indicators of economic diversification.

The findings of this study indicate that the oil-exporting countries adopted many policies to diversify their economies, like Indonesia, Malaysia, Chile, Mexico, and Norway. Some of them adopted import substitution policy to diversify the economy by producing goods that were previously imported, and from those who adopted the policy of encouraging exports to diversify their exports.

Through countries' experiences to diversify their economies, we observe that the success of the state's policy to build a sustainable economy, in the sense of economic diversification or diversification of income sources, and encouraging the private sector and foreign investment depends on:

-the use of oil revenues provides the necessary infrastructure to kick-start growth in other sectors and finance its investment. -Improving export performance focuses on products in which the country has comparative or potential advantages that enable it to compete in international markets.

In contrast to Algeria, all those countries have used their oil revenues to stimulate and develop other sectors, improve export performance, improve infrastructure, and encourage innovation and scientific research, which Algeria could implement to get out on his dependency.

In this review of empirical economic literature, we presented a panorama of studies and research that enabled us to understand the challenges of economic diversification in certain areas. To sum up all these contributions, it can be noted that not all oil-rich countries are equally successful in developing a diversified economy. While Malaysia, Indonesia, and Mexico have been prosperous in diversifying their economies away from a single source of income, mainly oil, other countries with oil economies, including the Gulf Cooperation Council (GCC) countries (Algeria, Bahrain, Iran, Iraq, Kuwait, Libya, Oman, Qatar, Saudi Arabia, Russia, Congo, and Venezuela), have had limited success in their economic diversification efforts. These economies heavily dependent on a limited number of industries (e.g., oil) suffer from the so-called "natural resource curse."

**4.Methods and tools used in the study:**

This part will try to apply an econometric analysis between economic growth and economic diversification by following the economic approach's steps. This chapter includes an attempt to identify the most important economic variables that affect Algeria's economic diversification, and where we rely on some economic theories and previous studies. Using methods, tools, and standard and statistical economic tests are considered an essential tool in understanding and explaining economic phenomena, depending on the Eviews8 program. Finally, an attempt is made to forecast and analyze the econometric model estimation results from 2000 to 2019.

**4.1. Model of study:**

The form of the study can be formulated as follows:

A-The mathematical form of the equation is:

$$\text{GDP} = f(\text{AGR}, \text{IND}, \text{SERV})$$

B-and linear form:

$$\text{GDP} = \beta_1 + \beta_2 \text{AGR} + \beta_3 \text{IND} + \beta_4 \text{SERV} + \text{Et}$$

- Economic growth expressed as a GDP growth (% annual) (GDP) is a dependent variable.
- Agriculture, forestry, fishing, value added (% of GDP) (AGR), an independent variable.
- Industry (including construction), value added (% of GDP) (IND), Independent variable.
- Services, value added (% of GDP) (SERV), Independent variable.
- t: Time represents the value of the variable in a year.
- $\beta_1, \beta_2, \beta_3, \beta_4$ : Represent the model parameters.
- ARG, IND, SERV are independent explanatory variables that change outside the model. As for the data sources, they were all from the World Bank database (Algeria).

**4.2.View and discuss results:****4.2.1.Initial tests (time series stability test):**

By conducting unit-roots, we aim to reveal the properties of time series, to ascertain the extent of its static and stability, and to determine the order of integration of variables, and this is with the help of Dickey-Fuller and Phillips Perron tests of the unit root, which test the null hypothesis of the existence of the unit root. Thus The time series does not reflect stillness.

**A-Augmented Dickie Fuller Test (ADF):**

Note through the table, accept the null hypothesis at the level because the calculated value is more than the critical value for all variables ( $\text{Prob} > \alpha = 5\%$ ). Hence, all the series are not stationary. Therefore, we will move at the first difference to test the stationary. It becomes clear to us that the null hypothesis is rejected due to the absence unit root in the time series, i.e., the variables are stationary at the first difference or integrated from the first order at the degree of significance  $\alpha = 5\%$ .

Table 1.the results of the ADF test

		GDP	AGR	IND	SERV
LEVEL	t-statistic	-3.4192	-1.6587	-1.6802	-1.9427
	t-calculate (5%)	-3.69	-3.69	-3.69	-3.69
	Prob	0.0784	0.7294	0.7199	0.5936
	the decision	Acceptance of H0 is unstable	Acceptance of H0 is unstable	Acceptance of H0 is unstable	The acceptance of H0 is unstable.
1st difference	t-statistic	-6.9052	-5.2657	-4.1187	-4.0516
	t-calculate	-3.69	-3.69	-3.69	-3.69
	Prob	0.0001	0.002	0.02	0.02
	the decision	Rejection of H0 is stable	Rejection of H0 is stable	Rejection of H0 is stable	Rejection of H0 is stable.

Source: Prepared by the researcher based on eviews 10 output.

#### B.Phillips Perron test:

Table 2.The results of the PP test

		GDP	AGR	IND	SERV
LEVEL	t-statistic	-3.3832	-1.658712	-1.722261	-1.993154
	t-calculate (5%)	-3.69	-3.69	-3.69	-3.69
	Prob	0.0835	0.7294	0.7010	0.5679
	the decision	Acceptance of H0 is unstable	Acceptance of H0 is unstable	Acceptance of H0 is unstable	The acceptance of H0 is unstable.
1st difference	t-statistic	-6.8521	-5.456389	-4.118742	-4.051686
	t-calculate	-3.69	-3.69	-3.69	-3.69
	Prob	0.0002	0.0019	0.0231	0.0261
	the decision	Rejection of H0 is stable			

Source: Prepared by the researcher based on eviews 10 output.

Through the table, we notice the acceptance of the null hypothesis at the level. Thus, the time series's instability at the degree of significance  $\alpha = 5\%$  because ( $\text{Prob} > \alpha = 5\%$ ), so we will move to the first difference test. From it, it becomes clear to us that the null hypothesis is rejected due to the absence of the chains. Unity in all variables, if we say that the time series is stable at the first difference.

So the results of Dickie Fuller and Phillips Perron confirm that all the model variables are stable of the first order so that the hypothesis of its instability at the level of significance of 5% was accepted. In contrast, the results confirmed that it is stable at the first difference.

**C.The test for determining the number of lag periods (degree of lagging time):**

Determination of the number of time lag periods, i.e., the test of the degree of delay of the path depending on the criteria: Akaike and Hannan - Quinn information criterion, Schwarz, as well as the Final prediction error, which select the period during which these indicators are the lowest, However, which tests the hypothesis that the parameters of the time lag periods combined are not statistically significant. Moreover, the LogL benchmark, where we take the most value.

**Table 3.Time lag count test results**

Log	Log L	LR	FPE	AIC	SC	HQ
0	-127.2788	NA	25.41874	14.58654	14.78440	14.61382
1	-83.51222	63.21844*	1.233440*	11.50136*	12.49066*	11.63777*
2	-76.96613	6.546087	4.927016	12.55179	14.33254	12.79733

Source: Prepared by the researcher based on eviews 10 output.

Through the table and depending on most of the criteria, we say a time slowdown in the first period, meaning that the acceptable delay is p=1.

**D.Johansen test: Cointegration:**

After studying the strings of the study's subject in terms of stationarity, the results showed that all the series are state at the first differences. From that, it becomes clear that there is a possibility of a cointegration relationship between them in the long run. The Johansson test is more general and comprehensive, presenting the Trace test and the Eigen values test for the distinct roots. Suppose the calculated value is greater than the tabular value. In that case, the hypothesis will be rejected. So, there is no integral vector for the study variables, and accept the hypothesis stating that there is at least One integral vector. If the opposite is true, the result lead to accept the hypothesis that there is no cointegration relationship.

**Table 4.the result of the trace test**

Trace Test			
The tabular value at $\alpha= 5\%$	Calculated value	Alternative hypothesis	Nullhypothesis
47.85613	30.65399	R>0	R=0
29.79707	17.76621	R>1	R=1
15.49471	6.925802	R>2	R=2
3.841466	0.212125	R>3	R=3

Source: Prepared by the researcher based on eviews 10 output

Table 5.the result of Egs values

Egs values Test			
The tabular value at $\alpha=5\%$	Calculated value	Alternative hypothesis	Null hypothesis
27.58434	12.88778	$R>0$	$R=0$
21.13162	10.84041	$R>1$	$R=1$
14.26460	6.713677	$R>2$	$R=2$
3.841466	0.212125	$R>3$	$R=3$

Source: Prepared by the researcher based on eviews 10 output.

From the previous tables ,the results of the Johansson test confirms the acceptance of the null hypothesis because the computed value of the effect statistic is smaller than the scheduled value of it at the 5% level of significance ( $30.65<47.85$ ), which means no Existence of a segregation relationship. Trace. The test indicates no cointegration at the 0.05 level.

As for the test of Eigenvalue, it came to confirm the results of the Trace test, as the calculated value of the impact statistic is smaller than the tabulated value for it at a significant level of 5% ( $12.88<27.58$ ), and consequently there segregation relationship between the crude GDP and other sectors, which means That the variables can have a representation of the autoregressive model. Thus, there is no long-run relationship between the variables of the model.

#### 4.2.2. Vector Autoregressions (VAR) :

To examine the relationship between study variables in the short term, two methods of analysis are used, and are the variance decomposition (VD) and the impulse response function (IRF).

##### A.Variance Decomposition (VD) :

The Variance decomposition tool is used to identify the amount of variance in the forecast for each model variable.

table 6.Variance decomposition of GDP

Period	S.E.	GDP	AGR	IND	SERV
1	1.239019	100.0000	0.000000	0.000000	0.000000
2	1.819263	50.39066	17.50369	9.581298	22.52435
3	1.948339	47.56027	15.57645	8.532565	28.33072
4	2.049466	44.94892	14.21573	7.900149	32.93520
5	2.093378	44.75043	13.67062	8.385254	33.19370
6	2.123658	44.31909	13.29690	8.223543	34.16047
7	2.149855	43.95917	13.07463	8.699497	34.26671
8	2.173010	43.54918	12.82189	8.834489	34.79444
9	2.197245	43.12697	12.55651	9.134551	35.18197
10	2.222471	42.66188	12.27338	9.197407	35.86733

Source: Prepared by the researcher based on eviews 10 output.

Based on the results in Table No. 11, it appears that the services sector is the main explanation for future changes that occur in GDP growth, so that about 28.33% of its short-term fluctuations are explained (the third period), to keep increasing until it reaches the level of 33.19% by The fifth year, while in the long term, it rises to 35.86%. This confirms the great contribution of this sector to the Algerian economy in its various branches such as tourism, transport and trade ... through various investments and economic transactions, which makes it the first compared to other sectors.

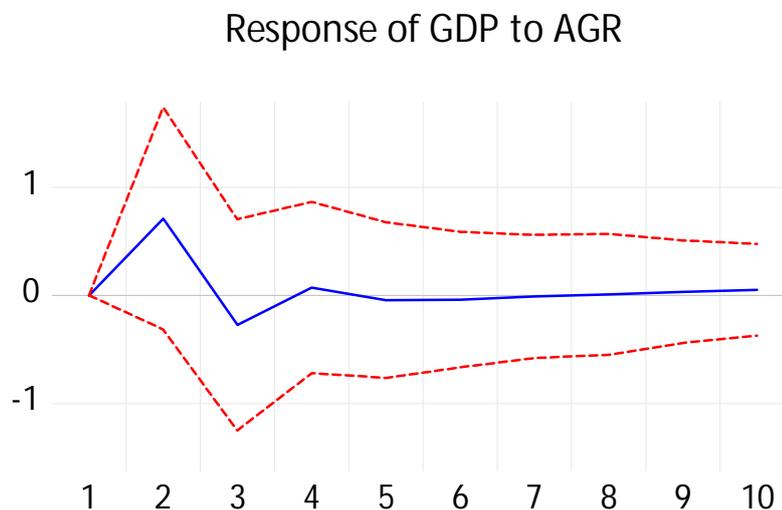
As for the agricultural sector, it explains the future variables of GDP at unpredictable weak rates, which are in constant decline, reaching 17.5% and 15.57% in (period 2 and 3). In the long term (period 07, 08, 09 and 10), they ranged from 13.26% to 12.27%. This is due to the absence of agricultural strategies, their ineffectiveness, the marginalization of this sector, which is very important and the key to economic diversification for Algeria, and its dependence very much on the hydrocarbon sector.

In the last, we find the industry sector, whose results explain fluctuations in the short and long term between 8% and 9%. This is due to the lack of change in the policies and objectives related to this sector, the continuation of ineffective old strategies, the failure to renew and keep pace with the technological development in this sector.

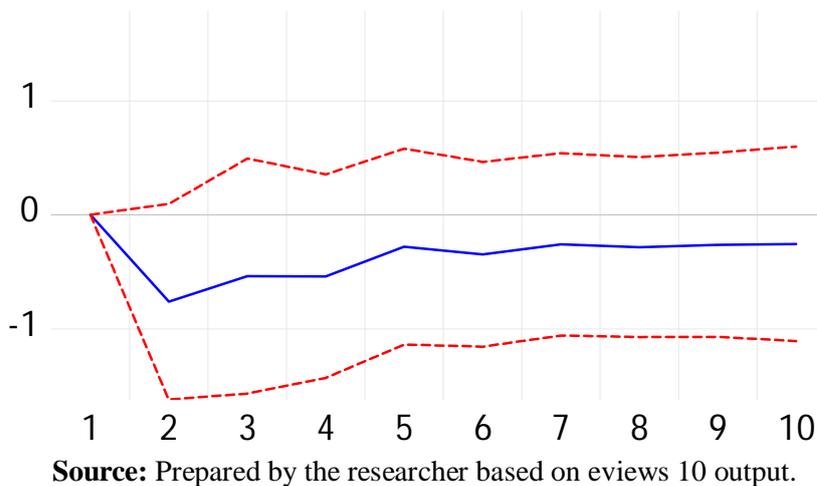
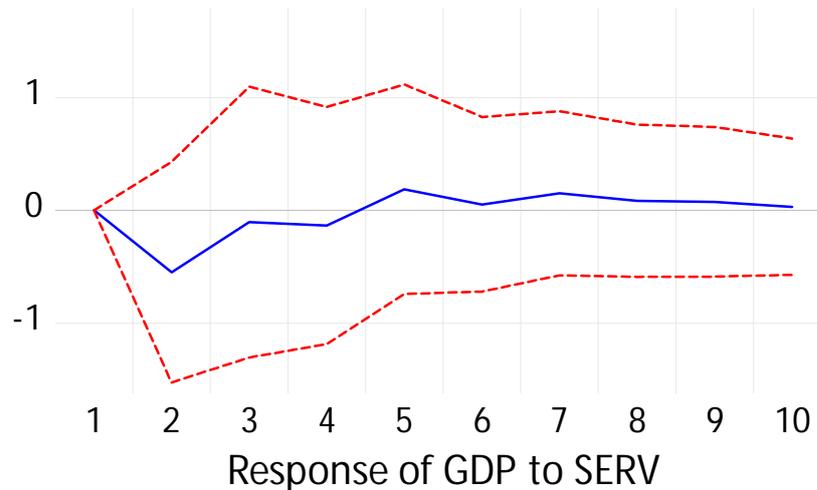
**B.Impulse Response Function (IRF):**

The Impulse Response Function (IRF) is the second tool for analyzing the dynamic relationship between variables of the autoregressive model produced after the variance decomposition. The impulse response function shows the extent to which each of the variables responds to the internal model. Unexpected shocks within the error limits of the variables: their amount, one standard deviation; That is, the impulse response function is computed by the form (Y) variables matrix differential formula with respect to the random error limit  $U_t$ .

**Fig1.Graphic representation of a shock impulse response function (IRF) in the economic variables explained**



## Response of GDP to IND



Source: Prepared by the researcher based on eviews 10 output.

- 1-The response of GDP to a positive shock to the agricultural sector AGR was positive during periods 1 and 2 and reached a peak of (0.76), then this effect is negatively significant during period 3 to reach (-0.11), then it becomes a positive significant effect in period 4 by (0.08), then after this period it becomes a negative significant effect until a goal Period 9 and null in period 10 (long term).
- 2-We note that a positive shock to the IND industry sector has a significant negative impact in period 1 and 2. While it had a significant positive effect in period 3 to reach (0.08), then a significant negative effect was recorded in period 4 by (-0.09), and then from period 5 to 10 (long term), we recorded a significant stable positive effect that did not exceed (0.19).
- 3-The response of GDP to a positive shock to the servicing sector SERV has an significant negative effect (in the short and long term), reaching in the period 2 to (-0.86) and stabilizing at about (-0.27) between period 5 and 10.

### 4.3. The results:

This study investigates the impact of the agricultural, industrial, and services sectors on the GDP growth in Algeria from 2000 to 2019. Based on our analysis, we found that there is a short-term relationship between GDP growth and the determinants of economic diversification represented by these three sectors. The results of the econometric study lead us to the following conclusions:

- All variables were unstable at the level, but stable at the first difference due to the weak contribution of sectors outside of hydrocarbons, reflecting the Algerian economy's dependency on the oil industry.

- 72% of GDP growth changes were explained by the independent variables selected in the study (agriculture, industry, and services sectors), while the remaining 28% can be attributed to other variables that were not included in the analysis. It's worth noting that there are many other variables that can explain the phenomenon of economic diversification.

- The agricultural and services sectors have a negative impact on GDP in Algeria due to their weak contribution to raising economic growth levels. These two sectors have been unable to achieve significant economic diversification results in Algeria.

- On the other hand, the industrial sector has a positive relationship with GDP growth. Although this sector contributes to a small percentage of economic diversification, it can still help in the process of exiting the rentier economy.

### 5. Conclusion:

As a general conclusion regarding the effectiveness of the economic diversification policy in Algeria, and based on the analyzes and statistics that we have made and obtained, we can conclude that economic diversification is ineffective in Algeria and its near absence in all sectors despite all the efforts and measures made by the state, but it remains. The hydrocarbon sector is the controller and the pillar of the Algerian economy.

Through our research, we recommend answers to the study hypotheses:

- The contribution of sectors outside hydrocarbons is positive in economic growth, but their rates are fragile, as the Algerian economy does not count on them.

- The agricultural sector's contribution to the process of economic diversification is feeble, which is due to the lack of investment in the agricultural field and modern technology, especially the qualified workers, which led to these completely unsatisfactory results.

We accept the last hypothesis, as Algeria's economic diversification is ineffective for several reasons, including the lack of clarity of economic policy and the failure to adopt and implement strategies without forgetting the bureaucracy strictly.

To enhance Algeria's economic diversification and get out of the oil sector's control, we propose the following measures:

- Expanding the study of economic variables related to economic diversification and the extent of their impact on economic growth.

- Considering countries' experiences about economic diversification policies, especially those that are incredibly close to Algeria, such as Malaysia, as it is one of the closest successful models of diversification to the Algerian reality.
- Fighting corruption of all kinds to create an ideal environment for economic dealings.
- Providing the necessary infrastructure for the growth of the private sector, as well as granting concessions for it.
- Relying on foreign direct investment to get out of oil dependency.
- Reconsidering the agricultural, industrial, and services sectors' policies to provide the ability to continue and compete and invest in them, especially in the formation of qualified human capital and technology.
- Exploiting renewable energies and investing in them as an alternative to oil

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## 7. Appendices :

### Database Used

YEARS	Unit (%)			
	GDP	AGR	IND	SERV
2000	3,8	8,3950485	53,3309697	33,110546
2001	3	9,74941999	49,1982826	35,7680526
2002	5,6	9,22498211	48,3006554	36,0524616
2003	7,2	9,81055804	49,9831408	34,4433061
2004	4,3	9,44047739	51,4983208	33,5839276
2005	5,9	7,69131487	56,5538885	30,9601554
2006	1,7	7,54307759	58,1285649	30,9590766
2007	3,4	7,57062579	56,6864816	33,2228469
2008	2,4	6,58667599	57,8354418	33,3851849
2009	1,6	9,34336541	46,9481768	40,7583548
2010	3,6	8,46644358	49,9674271	39,24604
2011	2,9	8,11058988	49,1401465	40,4668338
2012	3,4	8,77068636	47,3611684	40,5044838
2013	2,8	9,85111713	43,9041	42,2042479
2014	3,8	10,2863971	41,9403018	43,8892416
2015	3,7	11,5787073	35,3826967	48,5191656
2016	3,2	12,2200948	34,2488896	49,2931825
2017	1,3	11,7559033	36,3305788	47,6352838
2018	1,2	11,8742008	38,8051864	45,2874354
2019	1	12,3362121	36,8462154	46,3987273

Source: World Bank