

Algerian Economic Structure: Analytical and Econometric Study**Mohammed DAOUDI**University Center of Maghnia (Algeria), daoudim975@yahoo.com**Received:** 02/01/2022**Accepted:** 12/10/2022**Published:** 13/10/2022**Abstract:**

This study aims to analyze the structure of the Algerian economy and to show the contribution of other economic sectors other than hydrocarbons to the GDP, by applying the ARDL model and the Toda-Yamamoto causality test for the period 1990-2019. Through the results that we have obtained, (SERV 32.97%, AGRI 12.68%, BTP 9.55%, INDUS 8.19%), the structure of the Algerian economy will not experience any major change and things will stay the same in the long run. It is therefore imperative to speed up the reforms necessary to diversify the Algerian economy and activate the other sectors that make up the structure of the economy other than hydrocarbons.

Keywords: Economic structure; diversification; economic sectors, Algeria, ARDL model.**JEL Classification:** C51; E25; O47; L25.

1. Introduction:

The dominance of the hydrocarbon sector over the Algerian production structure, as a result of its increase in its contribution to total exports by 98%, which means that economic policy focuses on it as a key factor in achieving growth, and as a result of the lack of control in oil prices and the decline in the Organization of Petroleum Exporting Countries coverage of global demand from two-thirds in 1974 to The third, in 1984, played a major role in transmitting external shocks to the Algerian economy. So, Algeria faced great difficulties and complications due to the drop in oil prices, which strongly struck the depth of the Algerian economy due to the latter's connection with fuel revenues and oil revenues, as it is known, it led to a sharp decline. The price of oil on world markets ranged from 27 USD a barrel to 14 USD a barrel between 1985 and 1986, cause the collapse of Algeria's hydrocarbon revenues.

The period extending from 1999 to June 2014 was marked by resurgence in oil prices in world markets after their decline in 1998, when the price per barrel moved from 12.72 USD to 17.97 in 1999 to reach 38.27 USD in 2004. Price of barrel has come close to the threshold of 100 USD, since 2008 until it exceeded it, and this created a kind of financial comfort for Algeria, which was clearly reflected in its budget. So Algeria pursued an expansionary and developmental financial policy whose features were evident in the high volume of public spending within the framework of what was known as the economic recovery support scheme.

However, the collapse of oil prices on the international market as of June 2014 and its persistence, has affected once again Algeria's revenues from hydrocarbons and its budget. And then Algeria has entered into a financial crisis as a result of its heavy and excessive dependence on hydrocarbon exports by 98%, as is known.

While a large number of experts in international economics and energy agree that the shift in China's economic strategy from focusing on quantity to quality implies that the Chinese economy will not continue to consume energy at the high and strong rate it was. And the exploitation of shale oil and gas in the United States, two factors that, in addition to the imbalance in the balance of supply and demand, will lead to a significant decline in oil prices in world markets in recent years to come. And between the contradictory forecasts regarding oil prices between high and low, Algeria must work to get out of this closed circle and not remain locked in the conflict of interests of economic powers in the world, by reducing the dependence of the Algerian economy on hydrocarbons, and there is no way out that only work to diversify it.

Consequently, what is the nature of the structure of the Algerian economy? And to what extent does each sector contribute to Algeria's GDP? How to get rid of the domination of the hydrocarbon sector over the structure of the Algerian economy?

2. Theoretical basis:

There are a number of studies that attempt to show the nature of the relationship between economic diversification and growth rates in different economies. Ricardo's theory of comparative advantages, which confirms that specialization is a catalyst for increasing economic growth, meaning that this tends towards reducing economic diversification, but

the opposite trend shows that the decrease in the degree of economic diversification and reliance on the production and export of one or limited products has negative effects on economic growth rates. This result has been confirmed by a large number of studies economic, which called for increasing the degree of economic diversification and not to concentrate production and exports in a small number of products, sectors or activities.

Despite giving the comparative advantages resulting from specialization in production in general and export in particular, which finds Ricardo's theoretical framework strong and solid advantages for promoting specialization, and if economic diversification is not done, this may not stimulate economic growth in some economies, especially the economies of developing countries. This is due to the fact that these countries depend heavily on raw materials and extractive materials for their exports.

Therefore, if the prices of these raw materials are exposed to fluctuations in world markets, the shock will be directly on the revenues of these countries. It does not control the prices of these materials as a result of the control of multinational companies in most of the markets for these materials and their prices. This directly affects the stable financing of development plans in developing countries.

Therefore, focusing on a single product and specializing in it may expose developing countries in general and countries producing and exporting fuels in particular to violent shocks, as the prices of these products have decreased in global markets. This confirms the danger of focusing on a single product and not diversifying the economy, and then these countries are a demand by working to increase the degree of diversification of its economies to overcome price shocks.

Moreover, the theory of external comparative advantages, which is based on the high efficiency of using the resources traded at the state level, is linked in the economies of the countries producing and exporting fuels with internal comparative advantages that benefit the efficient allocation of resources within the local economy. Was it not for the low cost of extracting petroleum and petrochemical products that depend on cheap gas for their inputs? These countries would not have been able to benefit from this internal comparative advantage in exporting hydrocarbon products and achieving the external comparative advantage.

In contrast to the theory of comparative advantages, many believe that economic diversification leads to economic growth for the following reasons:

- Increasing the productivity of human capital and financial development, as economic diversification contributes to increasing the productivity of labor and human capital (Berthelemy & Soderling, 2001), and financial development, and this leads to an increase in economic growth rates. (Ramcharan, 2006)

- Reducing investment risks, as economic diversification increases economic growth rates by increasing investment opportunities and reducing investment risks. (Acemoglu & Zilibotti, 1997). The distribution of investments to a large number of economic activities reduces the risks resulting from concentrating those investments in a small number of them natural conditions such as earthquakes, droughts, floods, fires, and international conditions such as wars, armed conflicts, monopoly and financial services, can inflict heavy damage. In the production, marketing and consumption of some products. Which will undoubtedly,

affect the returns from these investments. Hence, diversification of investments and their distribution to a large number of products reduces investment risks, increases returns and ensures their stability. (Ramcharan, 2005)

- Reducing the risks to the production structure, as economic diversification leads to achieving several advantages by reducing the risks of the economy depending on production of a single product or on a limited number and a few products, or its dependence on one sector or a limited number of sectors. The productive structure of a country's economy is at risk when it specializes in sectors with high levels of volatility and when the sectorial structure is highly focused on one product or one sector. (Koren & Tenreyro, 2007)

- Reducing the risks that lead to reducing the value of exports, because some countries that have a weak degree of economic diversification, and if the prices of exported products decrease, the export earnings of hard currency will automatically decrease, and as a result the financing capabilities and capabilities of these countries will decrease, which will negatively affect them. Its import and economic development. (Heiko, 2008)

- Stimulating and raising the rates of trade exchange, as the decrease in the prices of products exported to the world markets with the stability or rise of import prices will lead to a lower level of the rate of trade exchange. When foreign trade depends on the export of one and only product, its lower prices will lead to a decrease in the prices of exports compared to the prices of imports, as a result of the important weight that this product occupies in weighting the indices of export prices, and that means the state's loss in its foreign trade (deficit in the trade balance). When exports are diversified, the risk of a decline in the export price index will be distributed to a large number of goods and services, and this will lead to a reduction in losses resulting from fluctuations in the prices of exported goods, and from this to an increase in the rate of trade exchange. Many studies have shown the positive and positive relationship between export diversification and economic growth. (Tyler, 1981) , (Balassa, 1985) , (Peter & Chow, 1987), (Ram, 1987), (Krueger, 1990)

- Achieving sustainable development, as a number of studies that dealt with fluctuations in economic growth rates showed that poor countries were unable to reach sustainable and continuous development for three reasons, all related to weak economic diversification, the first reason related to the specialization of poor countries in production and export for a small number of the products, the second is related to the repeated exposure of these countries to severe macro shocks, and the third reason is related to the high volatility at the macroeconomic level as a result of the impact of shocks on the specialized sectors. Accordingly, the high degree of economic diversification will, in turn, lead to stable economic growth rates and the achievement of sustainable development. (Romer, 1990), (Dawe, 1996) .

3. Sectors of the structure of the Algerian economy:

3.1 The industrial sector in Algeria:

The industrial sector is experiencing a continuous drop in production in all branches of activity. With the exception of the energy and hydrocarbons sectors, which have experienced steady growth, all other sectors have suffered, to varying degrees, significant rates of decline. Thus, overall, the level of industrial production reached in December 1999

represents only 74.8% of that of 1989. After more than ten years, industrial production has fallen by more than 25%, hydrocarbons grew by 22%. (Ministry of Finance, 1999-2011)

There are three types of sectors in Algeria according to their evolution; sectors that have experienced positive developments such as hydrocarbons and energy, and in particular the production of electricity. The second group of sectors concerns activities that have experienced a slight decline such as the agro-food industries, the chemical and pharmaceutical industries, and finally the construction materials industries. The third group concerns heavy industry which has experienced a drop of more than 40% and, finally, manufacturing industries, such as textiles and leathers, which have experienced a real collapse in their production. As for the production capacity utilization rate, never having been very high before the beginning of the 1990s, it did not stop falling afterwards, further aggravating the financial imbalance of companies which bear fixed costs of higher and higher.

The production capacity utilization rate reached in 1989 was of the order of 57.4% and fell to 41.5% in 1997. This rate naturally varies according to the activity sector. The ISMMEEs experienced one of the lowest rates already in 1997 (34%), like the chemicals and textiles sectors; the agro-food sector with the highest utilization rate did not exceed 65% in 1997. This sharp contraction in production had important effects on the industrial sector. (Bank of Algeria report, 1999)

In the conception of "industrializing industries", industry was gradually to occupy the main place in the structure of national production. However, after a positive development, history has just caught up with industry which, in 1998, occupied a place similar to that which it occupied in 1974, that is to say 10.6% of the gross domestic product (GDP) as it does, has not changed much in recent years, 12% in 2017. The latest report from the Ministry of Industry regrets that "the added value of the industrial sector is insufficiently represented in the national GDP. (World Bank, 2019)

3.2 The agricultural sector in Algeria:

The contribution of the agricultural sector to the GDP has averaged 11.16%, and this is due to the lack of agricultural tools and also the lack of use of modern agricultural technologies, in addition to the lack of manpower in this sector due to rural displacement, which has become a difficult problem, and also the expansion of cities at the expense of land. In addition to the economic reforms that affected the agricultural sector at the time, during the economic reforms supported by the International Monetary Fund, which touched the following axes:

- liberalizing prices and raising final subsidies on the prices of cereals and milk
- Devaluation of the national currency
- Liberalizing foreign trade and reducing customs duties
- Reform of the real estate system for the agricultural sector, which negatively affected the performance of the agricultural sector despite the upward trend of agricultural production.

This sector is characterized by a low contribution to the formation of GDP compared to other sectors, but at better rates than the previous period, as the percentage of contribution increased from 31.12% in 1998 to 32.21% in a year, thanks to the development

efforts made to develop this sector, to decline again in 2000, achieving a rate 8.8%. (ONS, 2011)

3.3 The service sector in Algeria:

The services sector is considered one of the main economic sectors in Algeria due to the significant contribution to the GDP, and this sector includes productive services activities, which include trade, restaurants, hotels, transportation, storage, finance, insurance, banking, and social services activities, which include housing, utilities, government services and other services. We note that the services sector is the second sector contributing to the formation of the GDP with an average of 19.31%, as the percentage of contribution during this period was characterized by fluctuation, as in 1990 it witnessed a rate of 91.97%, to decrease in 1991 to reach 12.27%, to increase again during the remaining three years of the period to reach 91.98% Of the GDP for the year 1994, as the economic reforms supported by the international financial bodies did not have a significant impact on this sector during the period. (IMF, 2012)

The services sector remains an important factor in the formation of the GDP, as its contribution has increased by a factor two percentage points, from 19.31% in 1995 to 93.12% in 1998, and by studying the composition of services, it shows the development of the added value for both services outside the public administration and public administration services, as we note that the highest percentage in the services sector was for services outside the public administration with an average of 22.79% due to the expansion of the transmission and distribution activity. (ONS, 2011)

As for the service sector in Algeria, it is experiencing a gradual improvement in its contribution to the formation of the gross domestic product, reaching 10620.3 million Algerian dinar in 2015 compared to the year 2000 when it was around 1841.9 million of Algerian dinar, and this is due to the policy of Algeria in the development of various indicators of human development. (World Bank, 2019)

3.4 The building and public works sector:

Accounted for 8.5 % of GDP in 2001 against 8.2 % in 2000, growth in the sector was only 2 % in 2001. In the public works sector, main actions undertaken in 2001 focused on the relaunch of projects linked to the East-West motorway; strengthening and modernizing the road network; operations to open up isolated municipalities and the resumption of work port and airport infrastructure. The housing sector, at the end of June 2001, was characterized by a decline in results in terms of the launch and delivery of housing. In the second half of 2001, this sector delivered 53173 housing units against 75340 over the same period. (IMF, Economic Outlook in Africa, Algeria, 2003)

4. Empirical investigation:

4.1. ARDL models Auto Regressive Distributed Lag/ARDL:

Dynamic models, the latter have the particularity of taking into account the temporal dynamics (adjustment period, expectations, etc.) in the explanation of a variable (chronological series), thus improving the forecasts and effectiveness of policies (decisions, actions, etc. .), unlike the simple (non-dynamic) model whose instantaneous explanation

(immediate effect or not spread over time) only restores part of the variation in the variable to be explained. In the family of dynamic models, there are three types of models.

In a dynamic model, a dependent variable (Y_t) can be explained both by:

- Its own staggered values. Such a dynamic model is called an "autoregressive model" (AR) and can be written:

$$Y_t = a_0 + a_1 Y_{t-1} + \dots + a_p Y_{t-p} + \varepsilon_t$$

$$Y_t = a_0 + \sum_{i=1}^p a_i Y_{t-i} + \varepsilon_t \dots \dots \dots 1$$

- The present values of the independent variables (X_t) and their time-shifted values (X_{t-j}). These are "staggered delay models" (DL) which have the form:

$$Y_t = \beta + b_0 X_t + \dots + b_q X_{t-q} + z_t$$

$$Y_t = \beta + \sum_{j=0}^q b_j X_{t-j} + z_t \dots \dots \dots 2$$

- Its own shifted values, present values of independent variables (X_t) and their time shifted values (X_{t-j}). These types of models combine the characteristics of two previous models and are called "Auto Regressive Distributed Lag" (ARDL model). Below are their following mathematical formula:

$$Y_t = \varphi + a_1 Y_{t-1} + \dots + a_p Y_{t-p} + b_0 X_t + \dots + b_q X_{t-q} + e_t$$

$$Y_t = \varphi + \sum_{i=1}^p a_i Y_{t-i} + \sum_{j=0}^q b_j X_{t-j} + e_t \dots \dots \dots 3$$

Note that " b_0 " reflects the short term effect of X_t on Y_t . To calculate the long-term effect of X_t on Y_t (ie " λ "), starting from the following long-term or equilibrium relationship: $Y_t = k + \lambda X_t + u$, we will do:

$$\lambda = \frac{\sum b_j}{1 - \sum a_i}$$

The ARDL models, which inherit the characteristics of the AR and DL models, suffer from certain econometric problems which complicate its estimation by Ordinary Least Squares (OLS), collinearity between explanatory variables (DL model), autocorrelation of errors (AR model), etc. Robust estimation techniques are generally used. (Pesaran, Shin, & Smith, 2001)

4. 2. Toda-Yamamoto causality:

Toda and Yamamoto propose non-sequential procedures to test the causality between series. For these authors, the preliminary tests of stationary and co-integration (Granger's sequential procedures) are of little importance to the economist who must worry about testing theoretical restrictions instead (they secure level information). These two authors will propose to estimate a corrected level VAR (over-parameterized), which should serve as a basis for the causality test, under the hypothesis of a probable potential co-integration between series that they integrate into the model without the study as such (explicitly). The procedure of the Granger causality test proposed by Toda and Yamamoto is as follows: (Toda & Yamamoto, 1995)

- Find the order of maximum integration of the series under study (dmax) by resorting to stationary tests.
- Determine the optimal lag or shift of the VAR in the level under study (k) or autoregressive polynomial (AR) using the information criteria (AIC, SIC and HQ).
- Estimate a VAR in increased level of order "p=k+dmax".

4.3. The model application:

We chose the model variables on the basis of internal influences, through knowing the effect of fiscal policy (public spending) and monetary policy (money supply and exchange rate) on inflation rate in Algeria on the one hand, and external influences through knowing the effect of the degree of trade openness on the other hand.

The data that is the subject of our study are annual and taken from O.N.S (National Office of Statistics), Bank of Algeria databases and reports of the World Bank (WDI). These annual data cover the period from 1990 to 2019. The variables used are as follows:

Variables	Descriptions and data
GDP	Gross domestic product, World Bank (WDI)
INDUS	The industrial sector outside of hydrocarbons % GDP, World Bank (WDI)
AGRI	The agricultural sector % GDP , World Bank (WDI)
BTP	The building and public works sector % GDP , Bank of Algeria
SERV	The services sector % GDP, World Bank (WDI)

$$GDP = f(INDUS, AGRI, BTP, SERV)$$

If we intend to capture the short-term and long-term effects of the above explanatory variables on INF, the ARDL representation of the function:

$$\Delta GDP_t = a_0 + \sum_{i=1}^p a_{1i} \Delta GDP_{t-i} + \sum_{i=0}^q a_{2i} \Delta INDUS_{t-i} + \sum_{i=0}^q a_{3i} \Delta AGRI_{t-i} + \sum_{i=0}^q a_{4i} \Delta BTP_{t-i} + \sum_{i=0}^q a_{5i} \Delta SERV_{t-i} + b_1 GDP_{t-1} + b_2 INDUS_{t-1} + b_3 AGRI_{t-1} + b_4 BTP_{t-1} + b_5 SERV_{t-1} + e_t$$

4.3.1. stationary test of series:

In this study, we used ADF test, the results are given as follows.

Table N°1: Unit root test ADF (Test of Stationary)

Vs	Level			1st difference			decision	lags
	Intercept	Trend and intercept	None	Intercept	Trend and intercept	None		
GDP	-4.31372* (0.0023)	-6.155155* (0.0001)	-3.076884* (0.0034)	-6.70914* (0.0000)	-6.56269* (0.0001)	-6.69126* (0.0000)	I(0)	1
BTP	-1.114015 (0.6952)	-1.852057 (0.6510)	0.319586 (0.7707)	-3.85170* (0.0072)	-3.8280** (0.0311)	-3.61268* (0.0008)	I(1)	1
INDUS	2.687318 (1.0000)	0.171650 (0.9964)	2.691089 (0.9973)	-1.928373 (0.3148)	-3.541*** (0.0556)	-0.832453 (0.3456)	I(1)	1
AGRI	2.504996 (0.9999)	-0.046202 (0.9932)	3.158317 (0.9992)	-1.663830 (0.4365)	-5.06266* (0.0020)	-3.73314* (0.0006)	I(1)	1
SERV	-2.194971 (0.2136)	-4.14894** (0.0189)	-0.291531 (0.5686)	-2.359908 (0.1647)	-0.573417 (0.9693)	-2.30886** (0.0236)	I(0)	2

(.): Probabilities; *: stationary at 1%; **: stationary at 5% *** stationary at 10%

Source: Eviews program outputs

Through the results of the stability obtained, it is clear that the time series of the model variables are not integrated with the same degree, which makes the co-integration test of Engle and Granger (multivariate case) and that of Johansen ineffective, and makes the test of ARDL appropriate.

4.3.2. Co-integration test from Pesaran et al. (2001):

We reported that the co-integration test at the terminals of pesaran et al. (2001) was adapted for our series. Also, remember that there are two steps to follow to apply the Pesaran co-integration test:

- Determine the optimal offset above all (AIC, SIC)
- Use the Fisher test to test for co-integration between series.

Optimal offset and estimation of the ARDL model:

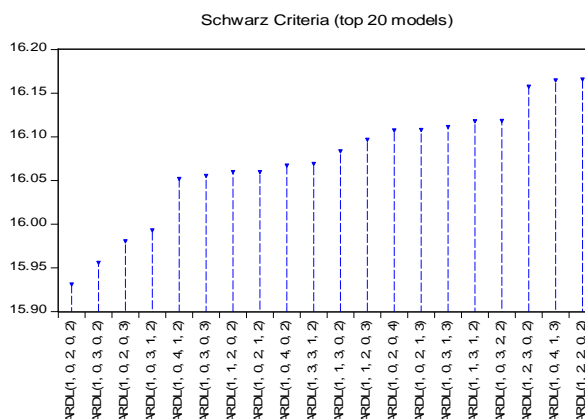
We will use the Schwarz Information Criterion (SIC) to select the optimal ARDL model, one that offers statistically significant results with the least of the parameters. Below are the estimation results of the optimal ARDL model selected (Table N°2, Figure N° 2).

Table N°2: ARDL model (1, 0, 2, 0, 2)

Dependent variable : GDP				
Variables	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	0.200371	0.186717	1.073124	0.2982
INDUS	26.24329	4.795988	5.471926	0.0000
AGRI	-6.683439	2.372081	-2.817543	0.0119
AGRI(-1)	5.654714	2.666885	2.120344	0.0490
AGRI(-2)	12.43851	4.521998	2.750668	0.0136
BTP	16.43325	3.757581	4.373360	0.0004
SERV	3.818110	1.878615	2.032407	0.0580
SERV(-1)	-9.074032	3.224224	-2.814330	0.0119
SERV(-2)	-9.114334	2.603614	-3.500647	0.0027
C	-3249.906	700.3612	-4.640328	0.0002
R^2 0.991967 Durbin-Watson 1.811318 F-statistic 507.0665 Adjusted R^2 0.994324 Prob (F-statistic) 0.000000				

Source: Eviews program outputs

Figure N° 1: Schwarz graph values



Source: Eviews program outputs

As can be seen, the ARDL model (1, 0, 2, 0, 2) is the most optimal among the 19 others presented, because it offers the smallest value of Akaike. Furthermore, with regard to the tests which help to diagnose the estimated ARDL model, we note the absence of autocorrelation of the errors, there is no heteroskedasticity, there is normality of the errors, and the model has been well specified (Table N°3).

Table N° 3: Results of diagnostic tests of the estimated ARDL model

Test hypothesis	Tests	Values (probability)
Autocorrelation	Breusch-Godfrey	3.750088 prob(0.2241)
Heteroskedasticity	Breusch-Pagan- Godfrey Arch test	7.883988 prob(0.5459) 2.833428 prob(0.1053)
Normality	Jarque-Bera	0.5337 prob(0.7657)
Specification	Ramsey (Fisher)	0.032148 prob(0.1657)

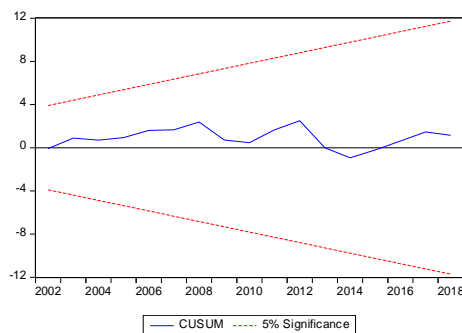
Source: Eviews program outputs

The null hypothesis is accepted for all of these tests. Our model is thus statistically validated. The estimated ARDL model (1, 0, 2, 0, 2) is generally good.

-Stability tests of the model

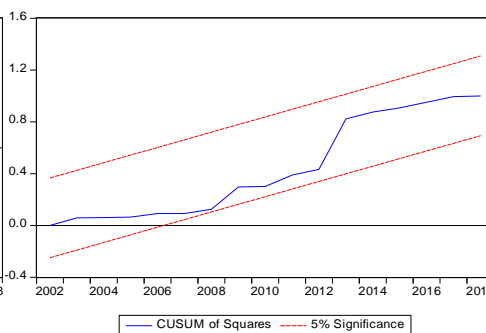
The two tests used to detect the presence of any structural changes in it are the cumulative sum of returned residues (CUSUM) and the cumulative sum of the squares of recurrent residues (CUSUM of Squares), and which we find in the ARDL model, So that the structural stability of the estimated coefficients of the error correction formula of the self-regression model of distributed time gaps is achieved, if the graph of the CUSUM and CUSUM of Squares tests falls within the critical limits at the level of 5%. The results are shown in the following figures:

Figure N° 2: CUSUM test



Source: Eviews program outputs

Figure N° 3: CUSUM of Squares test



Source: Eviews program outputs

Table N° 4: Results of the co-integration test of Pesaran et al. (2001)

variables	GDP INDUS AGRI BTP SERV	
F-stat calculated	8.030643	
Critical threshold	Bound <	Bound >
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

Source: Eviews program outputs

The results of the terminal co-integration test confirm the existence of a co-integration relationship between the series under study (in the Table N° 4 the value of F-stat is > that of the upper bound), which gives the possibility of estimating the effects long-term INDUS AGRI BTP SERV on GDP.

4.3.3. Causality between variables:

When non stationary variables are not co-integrated or are integrated in different orders, the traditional Granger causality test becomes inefficient. In this case, we resort to the causality test in the sense of Toda-Yamamoto which is based on Wald's "W" statistic, which is distributed according to a chi-square. The null hypothesis states the absence of causality between variables (probability Chi-sq > 5%).

From the Table N°6, we deduce the following causalities in the sense of Toda-Yamamoto: One-way causalities: the dynamics of GROWTH are caused by all the variables which are INDUS AGRI BTP SERV, It is a one-way causation, there is a causal relationship between INDUS and GDP, SERV and GDP (there is a feed-back).

Table N° 6: Toda-Yamamoto Causality Test Results

k	dma x	Vs	Explanatory or causal variables / VC (probability)				
			GDP	INDUS	AGRI	BTP	SERV
4	1	GDP	-	← 7.4578 ** (0.0240)	1.4186 (0.4920)	2.7996 (0.2466)	6.4554* (0.0396)
		INDU S →	16.3094* (0.0003)	-	1.4151 (0.4928)	1.0352 (0.5959)	1.1983 (0.5493)
		AGR I →	1.0555 (0.5899)	17.0399* (0.0002)	-	32.904 * (0.0000)	0.0041 (0.9979)
		BTP →	4.8169** * (0.0900)	0.5331 (0.7660)	4.8685** * (0.0877)	-	0.2000 (0.9048)
		SER V →	8.1692** (0.0168)	33.7178* (0.0000)	0.5389 (0.7638)	29.223 * (0.0000)	-

(.): Probabilities (p-value); *: significant at 1%; **: significant at 5%;***: significant at 10%
and values = statistics of Chi-sq → causality sense

k: optimal lag of the level VAR (Schwarz); dmax: maximum order of integration of variables

Source: Eviews program outputs

5. Results analysis:

5.1. Short-term coefficients (ST):

In the short term, there are only two variables that affect the GDP in Algeria, they are the agricultural sector and the service sector, the first affecting negatively and the second affecting positively.

- The agricultural sector contributes negatively to the GDP (-6.68%), its negative contribution continues during the next year (-12.43%).

- The service sector contributes positively to the GDP (+3.81%), and its contribution will increase positively in the following year, and this increase is very important. (+9.11%).

Table N° 7: Estimation results of ST coefficients

Dependent variable : GDP				
Variables	Coefficient	Std. Error	t-Statistic	Prob.*
D(AGRI)	-6.683439	1.592849	-4.195902	0.0006
D(AGRI(-1))	-12.43851	2.505030	-4.965415	0.0001
D(SERV)	3.818110	1.058982	3.605454	0.0022
D(SERV(-1))	9.114334	1.599066	5.699786	0.0000
CointEq(-1)*	-0.799629	0.101263	-7.896555	0.0000

Source: Eviews program outputs

5.2. Long-term coefficients and short-term dynamics:

As for the long-term, all the variables of the study model (INDUS, AGRI, BTP, SERV) affect positively and significantly on the dependent variable (GDP). And these results that we obtained do not deviate much from the current situation, so if there is no clear and strategic plan, the structure of the Algerian economy will remain dependent on the hydrocarbons sector.

We can classify the long-term contribution of the sectors that make up the structure of the Algerian economy apart from the hydrocarbon sector as follows (Table N°8):

1. SERV (32.97%)
2. AGRI (12.68%)
3. BTP (9.55%)
4. INDUS (8.19%)

Table N° 8: Estimation results of LT coefficients

Dependent variable : GDP				
Variables	Coefficient	Std. Error	t-Statistic	Prob.*
INDUS	8.1931	6.855417	4.787355	0.0002
AGRI	12.6884	4.741321	3.009466	0.0079
BTP	9.55108	4.405062	4.665333	0.0002
SERV	32.97114	4.597117	3.909221	0.0011

Source: Eviews program outputs

The non-hydrocarbon industry contributes only marginally to economic growth, 8.19%. The contribution of agriculture is just as marginal 12.68%. In total, more than 90% of growth is generated by hydrocarbons and the non-tradable goods sector (services, other services, construction).

If the situation remains as it is, it will not serve the Algerian economy at all. This made us wonder about the most important reasons why we achieved these results, therefore, find possible solutions to prevent this situation from continuing. Perhaps among the most important reasons that produced this situation, we mention the following:

- A number of difficulties still hinder the participation of the private sector, such as the complex nature of the regulatory framework and the slow procedures for establishing the company. Therefore, support measures directed at small and medium enterprises (95% of which are very small companies) that the state adopted in recent years (measures to encourage investment, access to industrial real estate and public orders, debt rescheduling, the national rehabilitation program) should be strengthened and strengthened in order to improve their capabilities in Areas of investment, production, and job creation.

- A financial system that does not respond to the needs of small and medium enterprises; Often companies cannot small and medium-sized banks obtain long-term bank liabilities due to their unavailability of guarantees.

- Food imports represent about 18% of the total volume of imports, which amounted to 47.5 billion USD in 2012, and about 55 billion USD in 2013, which is approximately 7% of GDP (ONS, Comptes économiques, 2013). The food industry provides one-third of the added value coming from the industrial sector and 40% of jobs in the industrial sector. (Ministry of Industry, Small and Medium Enterprises , 2012)

- The Algerian economy has benefited in part from support through public investments (major programs in the housing and infrastructure sector)

- The service sector currently employs 58% of the active population, at the expense of the sector Productive, i.e. industry and agriculture, the production of which remains insufficient. Industry (outside the hydrocarbons sector) represented less than 5% of the GDP in 2013 (4.2% in 2011) and 6% of job positions. As for the agricultural sector, whose contribution to the GDP is estimated at 9.7-10% Statistics, it covers only between 25 and 30% of the national needs of grains. The food bill has reached (mainly grains) and milk (9 billion of USD in 2012). (ONS, Comptes économiques, 2013)

- The decrease in the fuel sector's contribution to the formation of GDP after 2013 was not the result of an improvement in the contribution of other economic sectors, but rather a result of lower oil prices, as the price of oil decreased from 109.38 USD per barrel in 2013 to 99.68 USD in 2014 and then 42 USD in 2016. This led to a decrease in the fuel sector's contribution to GDP. The percentage of the contribution of the trade and services sector will increase. As for the agriculture and industry sectors, despite the decrease in the contribution of the hydrocarbon sector, its share remains stable and this indicates the weakness of these two sectors. (Bank of Algeria report, 2016)

6. Conclusion:

If the Algerian economy remains dependent on hydrocarbons as the only source of income, it will make it in constant and continuous exposure to external shocks, and ensuring the stability and balance of the Algerian economy and stimulating growth in it requires activating exports outside of hydrocarbons by paying more attention to other vital sectors, on top of which are industry, agriculture and services.

In other words, we must work to diversify the economy and reduce the severity of the Algerian economy's association with fuel, whose prices have not been stable since independence. As soon as it decreased, it would transfer severe shocks to the Algerian economy, and the recent sharp and unprecedented decline in barrel prices we are experiencing is a good confirmation of that. Therefore, Algeria must work hard to get out of the circle of the oil rentier economy and to invest in the field of agriculture and industry.

Services, which are very important sectors, and Algeria has important potentials in them, can be the undisputed alternative to the hydrocarbons sector, but this requires serious activation and great interest, through developing strategies and plans in the medium and long term based on a clear and effective economic policy.

Algeria must develop a new, more competitive industrial model capable of creating more jobs and contributing to local development. The structural transformation of the economy will require work to diversify the economy, develop innovation-based activities with high added value (define strategic industrial sectors), reduce subsidies, improve the business climate and integrate the informal sector.

7. References:

- Acemoglu, D., & Zilibotti, F. (1997). Was Prometheus Unbound by Chance? Risk, Diversification and Growth. *Journal of Political Economy*, 105(1), pp. 709–752.
- Balassa, B. (1985). Exports, policy choices, and economic growth in developing countries after the 1973 oil shock. *Journal of Development Economics*, 18(1), pp. 23-35.
- Bank of Algeria report. (1999). *Economic and Monetary Developments in Algeria*. Bank of Algeria report, Alger.
- Bank of Algeria report. (2016). *Economic report*. Bank of Algeria, Alger.
- Berthelemy, J., & Soderling, L. (2001). The Role of Capital Accumulation, Adjustment and Structural Change for Economic Take-Off: Empirical Evidence from African Growth Episodes. *World Development*, 29(2), pp. 323-343.
- Dawe, D. (1996). A new look at the effects of export instability on investment and growth. *World Development*, 24(12), pp. 1905-1914.
- Heiko, H. (2008). Export diversification and economic growth. *working paper N°21* (pp. 1-36). the international bank for reconstruction and development.
- IMF. (2003). *Economic Outlook in Africa, Algeria*. International Monetary fund, Washington.
- IMF. (2012). *Staff country report, statistical appendix(1998/2004/2006/2009/2012)*. International Monetary fund, Washigton.
- Koren, M., & Tenreyro, S. (2007). Volatility and Development. *The Quarterly Journal of Economics*, 122(1), pp. 243-287.
- Krueger, A. (1990). Asian Trade and Growth Lessons. *American Economic Review*, 80(2), pp. 108-12.

- Ministry of Finance. (1999-2011). *The behavior of the main macroeconomic and financial indicators 1999-2011*. Alger.
- Ministry of Industry, Small and Medium Enterprises . (2012). *Economic report*. Alger.
- ONS. (2011). *Rétrospective 1962-2011 Comptes économiques*,. ONS, Alger.
- ONS. (2013). *Comptes économiques*. ONS, Alger.
- Pesaran, M., Shin, Y., & Smith, R. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 16(3), pp. 289-326.
- Peter, C., & Chow, Y. (1987). Causality between export and industrial development. *journal of developing economics*, 26(1), pp. 55-63.
- Ram, R. (1987). Export and economic growth in developing countries evidence from time series and cross section data. *economic development and cultural change*, 36(1), pp. 51-72.
- Ramcharan, R. (2005). How big are the benefits of economic diversification? Evidence from earthquakes. *IMF working paper N° 05/48* (pp. 1-33). Washington: International Monetary Fund.
- Ramcharan, R. (2006). Does economic diversification lead to financial development? Evidence from topography. *IMF working paper N° 06/35* (pp. 1-45). Washington: International Monetary Fund.
- Romer, P. (1990). Endogenous Technological Change. *The Journal of Political Economy*, 98(5), pp. S71-S102.
- Toda, H., & Yamamoto, T. (1995). Statistical Inference in Vector Autoregressions with Possibly Integrated Processes. *Journal of Econometrics*, 66(1-2), pp. 225-250.
- Tyler, W. (1981). Growth and export expansion in developing countries. *journal of development economics*, 19(1), pp. 121-130.
- World Bank. (2017). *Algeria's economic situation monitoring report*. World Bank, Washigton.
- World Bank. (2019). *Algeria Economic outlook*. World Bank, Washington.