Non-Oil Exports Diversification and Trade Openness in Algeria: Empirical Analysis

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تنويع الصادرات غير النفطية و الانفتاح التجاري في الجزائر: دراسة قياسية

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Abstract:

The trade openness process is an important factor for diversifying non-oil exports, especially for economies that depends on raw materials. Like other developing countries, the Algerian economy is still dominated by the goods price fluctuations on international market because of the non-diversification of its economy. In fact, oil exports alone account for 97% of all exports. The main objective of this study is to determine the relationship between trade openness and diversification of national exports outside the hydrocarbons sector. To do this, we use the Vector Error Correction Model (VECM) for the case of Algeria during the period 1990-2016. Results indicate that the trade opening policy has a positive long-term effect on Algerian exports diversification outside the hydrocarbons sector.

Keywords: Trade openness, non-oil exports, export diversification, Algerian economy, VECM model.

JEL Classification Codes: F13 -011 - C33 - C50

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ملخص:

يعتبر الانفتاح التجاري من بين العوامل التي كان لها الأثر الكبير على ترقية الصادرات غير النفطية التي أصبحت ضرورة ملحة لاقتصاديات الدول النامية التي تعتمد اقتصادياتها على المواد الأولية، كما هو الحال بالنسبة للاقتصاد الجزائري الذي مازالت الصادرات النفطية فيه تحتل أكبر حصة من مجموع صادراته الوطنية بنسبة قدرها 97 %، مما يجعل اقتصادها رهينا للأسواق الدولية وكذا لتقلبات أسعار هذه المواد. انطلاقا من هنا، يعتبر الهدف الأساسي من هذه الدراسة هو تحديد العلاقة الموجودة بين الانفتاح التجاري وتنويع الصادرات غير النفطية في الجزائر. وللقيام بذلك، قمنا باستعمال نموذج تصحيح الخطأ الموجه لحالة الجزائر خلال الفترة الممتدة من 1990 إلى 2016. أثبتت نتائج الدراسة القياسية أن سياسة الانفتاح التجاري لها تأثير إيجابي في المدى الطويل على تنويع الصادرات الجزائرية خارج قطاع النفط.

كلمات مفتاحية: الانفتاح التجاري، الصادرات غير النفطية، تنويع الصادرات، الاقتصاد الجزائري نموذج تصحيح الخطأ الموجه.

تصنيفات JEL: F13 – 011 – C33 – C50

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INTRODUCTION

In recent years, the development of foreign direct investment flows and the promotion of exports are the main factors of the long-term economic growth. These factors are considered as the key elements of economic and trade openness policies that are adopted by governments of developing countries. In fact, the liberalization of foreign trade has become imperative to facilitate trade exchanges between countries by concluding regional trade agreements that systematically enhance interdependence between these countries.

Export diversification policies aim to reduce dependence on a specific number of exports relating to price and quantity fluctuations. The political economy divides diversification into two parts: horizontal diversification and vertical diversification. The *horizontal diversification* is the creation of new opportunities for new products such as mining and agriculture, while the *vertical diversification* is the use of the activity outputs such as, raw copper to be inputs to another activity as electrical wires to raise the added division of the product, and it is also intended to diversify sources of income by expanding the production base, and increasing the contribution of productive sectors in the overall local product. In parallel, diversification also means the process of exploiting all local resources and production energies in a way that ensures an accumulation of self-capabilities that are able to generate renewable resources, and reaching the stage of domination of local production over the internal market, and in successive stages the diversification of exports, as diversification is one of the priorities that translates interest in bridging the sources of underdevelopment and excessive dependency on the foreign party.

Like other developing countries, Algeria has been liberalizing its foreign trade and striving to diversify, develop its exports by developing its economic sectors and promote non-oil exports. In light of the economic crisis that Algeria is currently experiencing, it was necessary to search for alternative revenue other than the hydrocarbon sector revenues by diversifying the economy, encouraging national exports and moving the foreign trade towards other products in which Algeria has an apparent advantage. In fact, Algeria should change its approach to mono export (hydrocarbons) to direct export by diversifying exports, making the national economy strive to achieve self-sufficiency and supporting the public treasury in order to get out of its current crisis, especially with the deterioration and instability that characterizes the oil and natural gas market.

In this context, this article aims to study the relationship between trade openness and national exports diversification outside the hydrocarbon sector. To do this, we will try to answer the following question: ***does trade openness contribute to diversifying Algeria's exports outside the hydrocarbon sector?*** For this investigation, we estimated a vector error correction model (VECM) for Algeria over the period 1990 to 2016. Results show the existence of a long-term positive impact of trade openness on the promotion of Algerian exports outside the hydrocarbon sector.

1. Literature review

Export diversification has become a main factor determining and explaining the differences in growth rates across Africa and countries with a more diversified export composition has experienced faster growth. There are several researches that have studied the relations hip between trade openness and economic diversification. By studying the case of Algeria, *Bouklia-Hassan (2013)* examines the feasibility of speed growth in national economy outside hydrocarbons. He examines, on the horizon 2030, the necessary structural economic transformations, investment required for these transformations as well as the evolution of fiscal resources and exports compatible with diversification, internal and external balances of the economy. Results estimation indicates that the

accelerated diversification of the economy comes up against, due to unfavorable initial conditions. Estimation results highlights, also, the severity of obstacles facing an economy heavily dependent on hydrocarbons as Algeria has to face during its process of diversification and the scale of the effort it must make to preserve its internal and external solvency (Bouklia-Hassan, 2013).

Herzer, Nowak-Lehnmann, (2016) argues that a horizontal diversification of exports generates positive externalities to other sectors. On the other hand, a vertical diversification of exports occurs when a country's export structure shift from primary products to secondary or tertiary sectors, or manufactured products. These authors attempt to examine the hypothesis that export diversification is linked to economic growth via externalities of learning-by-doing and learning-by-exporting fostered by competition in world markets. They tested the diversification- led growth hypothesis by estimating an augmented Cobb-Douglas production function on the basis of annual time series data from Chile. The estimation results suggest that export diversification plays an important role in economic growth (Herzer & Nowak-Lehnmann, 2016).

Aljebrin, (2018) has examined the effect of non-oil trade openness (NTOP) and the financial development on economic expansion in Saudi Arabia. The author used in this study data from 1990-2016 to estimate the link between NTOP and economic expansion using the FMOLS approach which utilizes kernel estimators of Nuisance parameters that affect the OLS estimator's asymptotic distribution. Results shows that NTOP and stock market has expected positive and significant coefficient but the domestic bank credit to the private sector has considerable but negative unexpected sign. The error correction is correctly negatively signed and very significant (Aljebrin, 2018). In addition, *Ouali, Souman, (2018*) have studied the relationship between economic growth and export diversification for the case of Algeria using the multiple linear regressions method over the period 1990-2015. Results indicate the existence of a positively significant impact of diversification on economic growth. Thus, the growth of the diversification of exports concentration is seen as a solution to ensure a balanced trade balance (Ouali & Souman, 2018).

In the other hand, *Maliki and others (2021)* have studied the relationship between economic diversification and growth for the case of Algeria which is a with a very low non-hydrocarbon export rate and with a further drop in oil prices. They tested the effect of diversification on economic growth for the period (1980- 2015) by implementation of the ARDL model. There findings indicate a long-term association between growth and economic diversification followed by a negative sign. This result suggests the inverse relationship between economic growth and low economic diversification in Algeria and confirms the dominance of the hydrocarbon industry (Maliki, Si Mohamed, Hassaine, & Hartani, 2021).

2. Trade openness Indicators

The trade openness indicators are a set of adopted trade policies that express the commercial claims of a country. These indicators allow us to know the extent of the economic openness of countries in general and trade openness in particular. They are also used to arrange countries and classify them according to their degree of openness (Gräbner, Heimberger, Kapeller, & Spri, 2020). These indicators can be divided into three groups. The first group is based on measuring the degree of trade openness at the level of prevalence of customs barriers, or on the frequency of non-tariff barriers. The second group is based on measuring trade openness on the extent to which the country is able to produce at international prices and does not set any barriers on trade. The third group is based on the extent of the state's openness in terms of its exports and imports (Capolupo & Celi, 2008). Another division of the indicators of trade openness depends first on measuring foreign trade in terms of volumes and secondly on measuring trade openness in terms of trade restrictions.

3. Algerian export diversification strategy

3.1 Non-oil exports development in Algeria

Export has a major position in the economic development of all countries. That is why, the countries give it a great importance and a special attention by adopting strategies encouraging exports and focusing on export industries. In addition, export is considered as a strategic choice for economic growth and development especially for developing countries, because it contributes to changing the economic structure, increasing national savings, and reforming the deficit balance payments. Like other developing countries, Algeria has sought to diversify its economy by encouraging the non-hydrocarbon exports. In fact, this economy is mainly based on exports in the hydrocarbon sector (oil and gas), which are characterized with neither consistency nor stability. This is why the country's authorities are seeking to diversify its economic exports by exporting in non-hydrocarbon sectors. In reality, the Algerian non- oil exports are composed of the basic types shown in the figure below for the year 2015 (World Bank Indicators Report, 2016).

Fig (1): **Most important Algerian products exported outside of hydrocarbons in 2015**
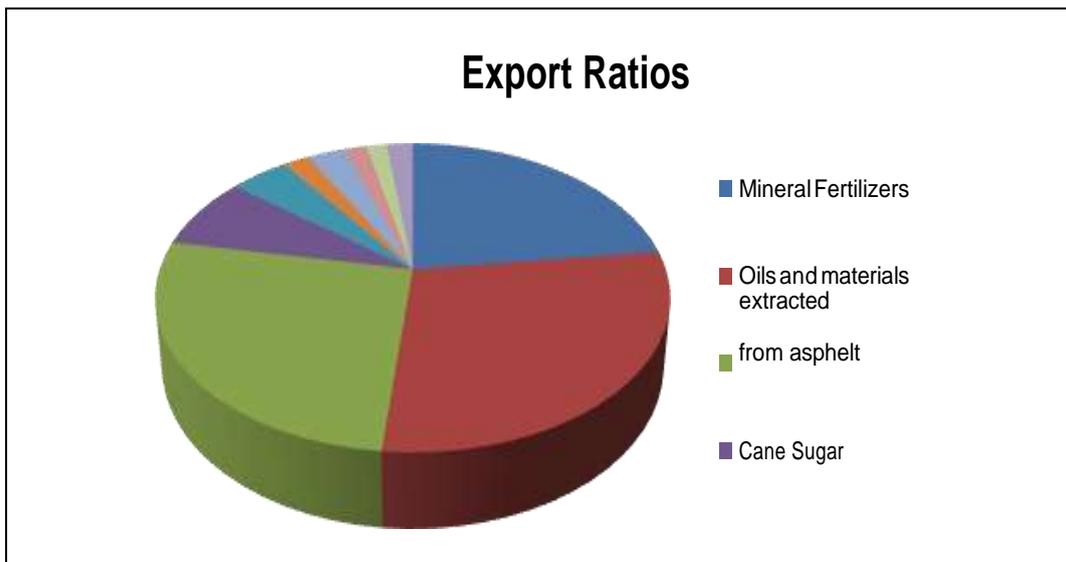
Source: Established by authors based on Algerian Customs Statistics on Foreign Trade (2015)

Fig (2): Most important Algerian products exported outside of hydrocarbons in 2016
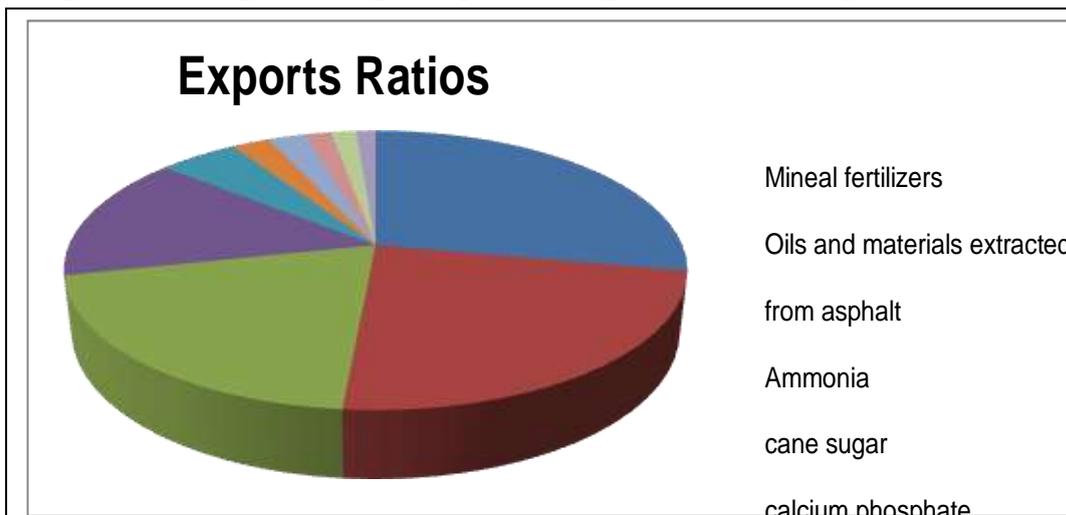
Source: Established by authors based on Algerian Customs Statistics on Foreign Trade (2016).

Based on the latest statistics published by the Algerian customs administration on foreign trade for the year 2016, it is clear that hydrocarbons represented 93.84 % of the total national exports in 2016, which means that other exports outside hydrocarbons did not even reach 7 %, meaning that they decreased by 17.12 % compared to the previous year. As for agricultural materials, it is a very small percentage, which was restricted, with a slight increase of 2.11 % in 2016 compared to the previous year.

In addition, the following figure shows the most significant importing countries of Algerian non-oil products.

Fig (3): Most important importing countries for Algerian non-oil exports for the year 2016
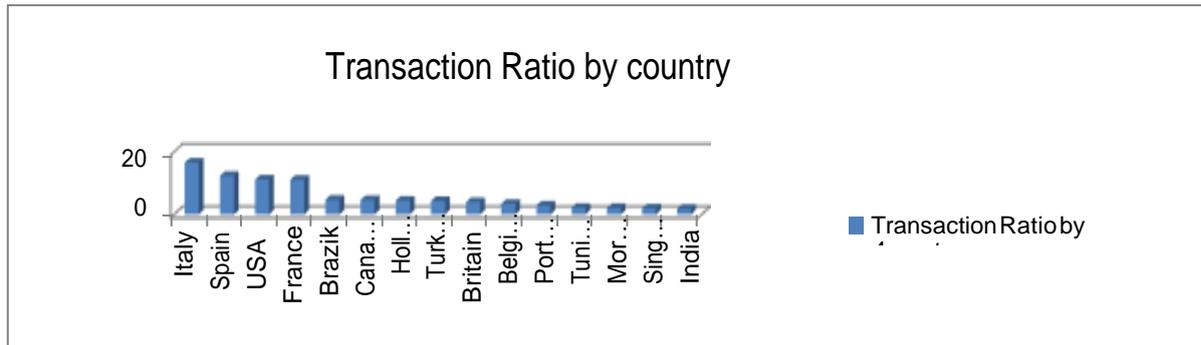
Source: Established by authors based on Algerian Customs Statistics on Foreign Trade (2016).

From this figure, it is clear that nearly half of Algeria's trade exchanges are with the EU countries.

3.2 Non-oil exports diversification strategy

The country's public authorities have drawn up a strategy to advance its non-oil exports as an urgent necessity (2019) to keep pace with the dynamic integration of the global economy and promoting foreign trade exchanges, we summarize the following steps (Bouri, 2020):

A- *The legal framework*: in February 13, 1991, a legislative framework was concluded with the executive decree no. 37/91 in order to establish freedom of foreign trade and promote exports. In reality, Algeria is in a new economic pattern and its approach to economic market is war, inevitably ending the state monopoly on export and import operations.

B- *The insurance and financing framework*: at the beginning of 1996, a new system was established to guarantee exports supervised by Algerian Company for Export Guarantee, (CAGEX), whereby exporting companies are insured against various risks, whether they are commercial or non-commercial risks or even natural disasters to encourage exporting enterprises and to penetrate global markets by enabling them to participate in international exhibitions and penetrate foreign markets. As for the financing side, they grant loans to societies wishing to export, either by importing the raw materials included in the product prepared for export or during the export process itself, or by establishing the only window at the banking level to facilitate financial operations for exporters. Also, the Special Fund for Export Promotion (FSPE) was established under the finance law of 1996, and its resources are allocated to provide financial support to exporters to upgrade their export activities abroad.

C- *The institutional and regulatory framework*: on institutional and organizational level, we find the following companies: the Algerian Chamber of Commerce and Industry (CACI), the Algerian Company for Markets and Exhibitions (SAFEX), the National Center for Quality and Package Control (CACQE), the National Center for Commercial Registry (CNRC), and the National Association of Algerian Exporters were established, in addition to the Ministry of Trade which was

established in 1997. In addition, in order to promote exports outside the hydrocarbons sector, ordinance no. 03/04 of 07/17/2003 has included an institutional viewpoint through the establishment of a national body in charge of promoting foreign trade. ALGEX has the authority to establish offices for linking representation and commercial expansion abroad in order to support the penetration of national institutions in foreign markets.

4. Empirical study

4.1 Descriptive data

To examine the contribution degree of trade openness on export diversification in Algeria, we use data from 1990 to 2016. The data used for the analysis have been collected from a various international database: The National Bureau of Statistics (ONS), the World Development Indicators (WDI), the CNUCED, the UNCTAD stat, the International Monetary Fund indicators (IMF).

4.2 Regression specification

From examination of theoretical and empirical literature review -studied the impact of the trade openness indicators on exports outside hydrocarbons- we specify the model of our study using several variables as indicated in the following equation:

$$EXPO = \beta 1\ (FDI) + \beta 2\ (GDP) + \beta 3\ (X\text{-}Rate) + \beta 4\ (TOPEN) + t\varepsilon$$

where:

EXPO: Algeria's exports outside hydrocarbons

FDI: Foreign Direct Investment

GDP: Gross Domestic Product

X-Rate: the exchange rate

TOPEN: Trade Openness

$\beta 1$, $\beta 2$, $\beta 3$, $\beta 4$: real numbers that we will reach with EVIEWS 9. To study the stability of the strings, we will use the Perron-Phillips Test (1988). The study variables are explained as follows:

- *Exports outside of hydrocarbons (EXPO)*: it expresses the total funds that the Central Bank collects from the export of various national products of goods and services to international markets. It represents the dependent variable of the study.

- *Trade openness (TOPEN)*: it indicates total exports, imports and crude GDP, according to the following equation:

$$TOPEN = (X + M)\ /\ PIB * 100$$

- *Gross Domestic Product (GDP)*: it's an economic indicator that measures the monetary value of the total goods and services produced within one country, during a specific time period. This indicator studies the development of the gross domestic product enables us to know the economic growth levels of the studied country.

- *Real exchange rate (X-Rate)*: it's defined as the domestic price of domestic goods in relation to the foreign price of a basket of foreign goods. It's calculated according to the following equation:

$$NER = E.\ /\ p$$

where:

NER: The nominal exchange rate

E: Domestic Price Index

P: Foreign Price Index

- *Foreign direct investment (FDI)*: it expresses the flow of funds across borders from the domestic country to the host country.

Table (1): Descriptive summary of the study variables

	EXPO	FDI	GDP	TOPEN
Mean	0.813704	9.74E+08	9.91E+10	63.78155
Median	0.640000	8.82E+08	6.79E+10	72.64662
Maximum	1.600000	2.75E+09	2.14E+11	109.4431
Minimum	0.280000	-4.03E+08	4224984.	8.957508
Std. Dev.	0.392489	9.37E+08	6.69E+10	24.13483
Skewness	0.742850	0.429570	0.401485	-0.709889
Kurtosis	2.303867	1.996694	1.829558	3.101354
Jarque-Bera	3.028394	1.962838	2.266533	2.279299
Probability	0.219985	0.374779	0.321980	0.319931
Sum	21.97000	2.63E+10	2.68E+12	1722.102
Sum Sq. Dev.	4.005230	2.28E+19	1.16E+23	15144.74
Observations	27	27	27	27

Source: Established by authors based on results of the Eveiws 9 program results

From this table, we notice that the sample size (years of study) amounted to 27 observations, which is a sufficient period to conduct a standardized study. If we compare the standard deviation (Std. Dev), we notice that the GDP variable is characterized by the largest standard deviation, then it is followed in succession by: FDI, X-Rate, EXPO.

As for the mean and the highest and lowest values for each variable (Minimum - Maximum), we note:

- GDP has the highest average of 9.91 million $, the highest value in 2014 and the lowest one in 1990.
- X-Rate has the highest value in 2016, and the lowest one in 1990.
- FDI has the highest value in 2009 and the lowest value in 2015.
- EXPO has the highest value in the years 2014 and 2016 and the lowest one in 1994.

4.3 Estimation results

4.3.1 Stationarity test results

The unit root extraction aims to identify the degree of integration of the variables time series, it is necessary to check whether series are stationary. Most of the time series for these variables are characterized by instability, so we will test the stability of these time series and determine the degree of stability of the variables using the Philips-Perron (PP) test at various levels. The statistical decision is as follows:

- if the probability is greater than 5%: we accept the null hypothesis (H_0) which indicate that the time series is not stable, due to the presence of a single root.
- if the probability is less than 5%, we reject the null hypothesis (H_0): which indicate that the time series does not have a single root, and therefore is stable.

Table (2): Stability test results

Variables	Probabilities	
	1st level	Level
EXPO	0.0000	0.7526
TOPEN	0.0005	0.6017
GDP	0.0045	0.6431
X-Rate	0.0193	0.5746
FDI	0.0000	0.2993

Source: Established by authors based on the Eveiws 9 program results

Results shows that the time series are not stable at the level (they did not fulfill the condition, Prob. > 0,05). For this reason, we applied the difference of the first order and concluded that the time series are stable at the 1st difference (Prob < 0,05), and therefore we reject the null hypothesis H_0, which indicates that the time series has no single root, and therefore it is stable in the same degree (1st difference). That's mean that the condition of simultaneous integration is fulfilled and all-time series are integral of the first order.

4.3.2 Cointegration test results

The Johanson test of cointegration is considered as the well-known test in this field, so we test the null hypothesis to determine which vectors represent a significant statistical level. Also, the integral vectors corresponding to the highest calculated "eigen-value" are tested, all under the null hypothesis H_0 that assumes that there are no concurrent integration vectors in the model. Since all variables are integrated in the first degree. This will conduct us to test the existence of a relationship between studied variables in the long run term. The Johanson test results appear in the following table.

Table (3): Johansen Co-integration test results

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenval ue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.768367	36.56505	33.87687	0.0233
At most 1	0.637136	25.34318	27.58434	0.0942
At most 2 *	0.594351	22.55667	21.13162	0.0313
At most 3	0.260654	7.549743	14.26460	0.4263
At most 4	0.054630	1.404463	3.841466	0.2360

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The second line-highlighted in yellow indicates the rejection of the null hypothesis (H_0) at the 5% significance level. Depending on the Maximum Eigen-Value table, results indicates the rejection of the null hypothesis, as well as the existence of a single vector for cointegration, which indicates the existence of a static linear combination between exports outside hydrocarbon sector, and each of the other variables of the study (GDP, FDI, X-Rate, TOPEN), meaning that "Expo" integrates simultaneously with the other studied variables, which leads us to say that there is a long-term equilibrium relationship between these variables, meaning that they do not diverge from each other much in the long term (the impact test indicated that there are three vectors). The first integral vector arrived at through the VECM can be written as follows:

EXPO = (1.29) E – (1.61E-09) FDI + 1.93E-11 (GDP) + 0.036389 X-Rate – 05 TOPEN

From this equation, we observe the existence of a positive impact of trade openness on exports outside of hydrocarbon sector in the long term. This is due mainly to the efforts of Algeria's authorities to liberalize trade exchanges with their recent efforts to establish 14 Tunisian free zones on the Algerian border regions as a form of partnership between Algeria and Tunisia to export their various products to African countries, which also explains the positive impact that we have reached in the equation for economic growth.

As for the exchange rate, we find that despite its positive impact on exports outside hydrocarbons, it still has a weak effect due to the type of exchange rate adopted in Algeria, and the state governs it from independence to today. In addition, the equation highlighted a negative impact of foreign investment on non-oil exports. This is due to the fact that most of the foreign investments in Algeria are based in the field of oil exploration and extraction and other investments are newly established, the effect of which has not yet been clear on exports outside hydrocarbon sector.

4.2.3 Vector-Error Correction Model (VECM)

The vector error correction model (VECM) is used as a means to adapt the behavior e_t of the variable in the short term to its behavior in the long term as shown in the following equations:

$$\Delta y_t = C + \lambda e_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta y_{t-1} + \sum_{i=1}^{p} \beta_i \Delta x_{t-1} + \varepsilon_t \qquad avec \qquad \lambda < 0$$

$$\Delta x_t = C' + \lambda' e_{t-1} + \sum_{i=1}^{p} \alpha_i' \Delta y_{t-1} + \sum_{i=1}^{p} \beta_i' \Delta x_{t-1} + \varepsilon_t' \qquad avec \qquad \lambda' < 0$$

$$et \qquad e_t = y_t - \widehat{\beta_0} - \widehat{\beta_1} x_t$$

The vector error correction model (VECM) is estimated using Eviews 9. We obtain the following results shown in table 4.

Table (4): Results of Vector Error Correction Model

Error-Correction:	D(EXPO)
CointEq1	-0.105327
	(0.05702)
	[-1.84712]
R-squared	0.403746
S.E. equation	0.214262
F-statistic	2.031410

Source: Established by authors based on the Eveiws 9 program results.

The model is interpreted by 40%, which indicates that the selected studied variables can explain the phenomenon by 40%, which is a good percentage because through this model, some non-significant variables were neglected and we are limited our estimation on the most important variables in our regards, knowing that exports are controlled by several other factors, such as scientific and technological progress, inflation rate that affect exchange rate and foreign direct investment, without forgetting the interest rates which affect the investment rates in any country. We note that the directed error correction factor is a significant and negative coefficient, and it represents the force of return to equilibrium in the long term, which means that the deviation from the equilibrium is corrected every year by (10.53%, with a speed of adjustment of (10 = 1 / 0.10)). This conducts us to accept the error correction model and ensure the existence of co-integration relationship between the study variables.

Fig. (4): Stability of the Vectorized Error Correction Model (VECM)

Inverse Roots of AR Characteristic Polynomial
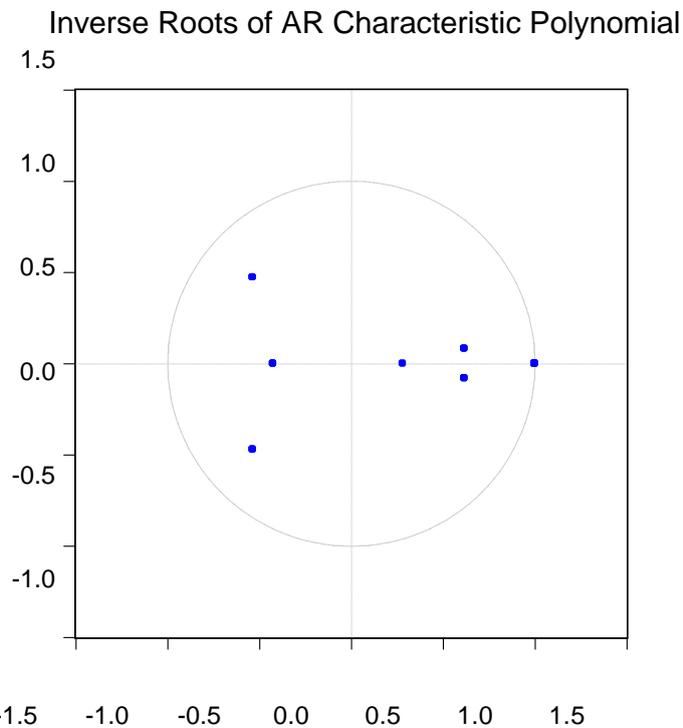
Source: Established by authors based on the Eveiws 9 program results

From this figure, we confirm that the estimated model satisfies the stability conditions (VAR

satisfies the stability condition), so all the coefficients are smaller than one and all the roots are within the unit circle, which means that the model is stable and does not suffer from standard problems.

4.2.4 Variance Decomposition

The variance decomposition test is used to find out the amount of variance in prediction that is due to prediction in the same variable and the amount due to error in other variables, i.e., it measures the amount of change (which is due to other variables in the model) in a variable, which is due to the change in the variable itself. In other words, error-variance analysis aims to determine and calculate the extent of its contribution to the error variance.

a. Impulse response function results

The response functions method takes into consideration the sum of the dynamic relationships, i.e. it works at the expense of the existing dynamic complications, as it shows after a shock in the errors the reaction of the system of internal variables. It shows, also, the effect of a sudden and single decrease of a variable on itself and the rest of the system variables at all times. To analyze the dynamic relationship between the model variables, it works to know the extent to which each of the internal model variables responds to unexpected shocks within the parameters of the variables' error, the amount of their deviation is one criterion. The next figure shows the results of the analysis of the batch response functions.

b. Response functions results analysis

● Non-hydrocarbon export responses "EXPO to EXPO"

As shown in figure (5), each standard deviation in exports outside hydrocarbons sector by 1% resulted in a positive response during the first period and then begins to gradually decrease from the first period until approximately the third period, and then it rises again after this period. It remains in fluctuation until we notice its stability almost during the recent periods, i.e. from the sixth to the tenth period (we have noted this in our explanation of the previous table).

● Foreign Investment Responses "EXPO to FDI"

From our observation of the foreign investment response curve, we notice that it begins with a null effect at start, to move to a negative impact on exports outside of hydrocarbons, which is found previously in our equation of the relationship of exports with the study variables. It starts from the first period to the tenth period despite the recovery and increase from 0.54% to 4.11% to the fact that it remained negative, which is the reality of foreign investment in Algeria. To explain this result, we notice the car market factories, for example. There are three factories to install cars in this country (Kia, Hyundi, Renault) but despite this, Algeria was not able to export any type of cars and was unable to achieve a comparative advantage neither in terms of price, nor in terms of technology or in other side terms; it was not even able to meet the national need, and left the prices to speculation until they became more expensive than the years of importing them, and accordingly, our results are identical to the lived economic reality.

● Trade Openness Responses "EXPO to TOPEN"

We notice that there is a positive effect, starting from the first period to the end of the fifth period, where we notice a slight decrease during the sixth and seventh period, and then return to the rise to reach its maximum during the eighth period and went to stability during the last two periods, i.e. the ninth and tenth period. Despite this fluctuation, it remained always conservative on its positive effect, which we explained through the previous table.

Fig. (5): Impact of response analysis results

Response to Cholesky One S.D. Innovations

Response of EXPO to EXPO

Response of EXPO to IDE

Response of EXPO to TC

Response of EXPO to OPEN
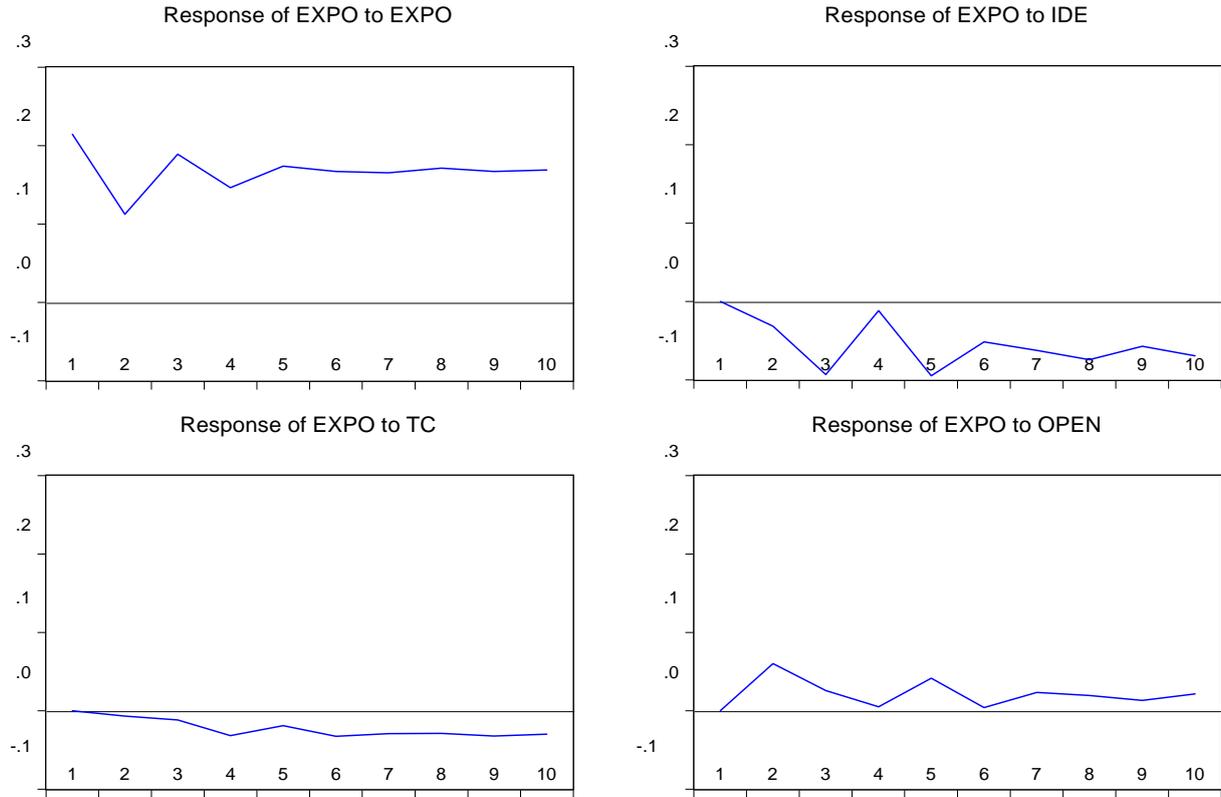
Response of EXPO to PIB
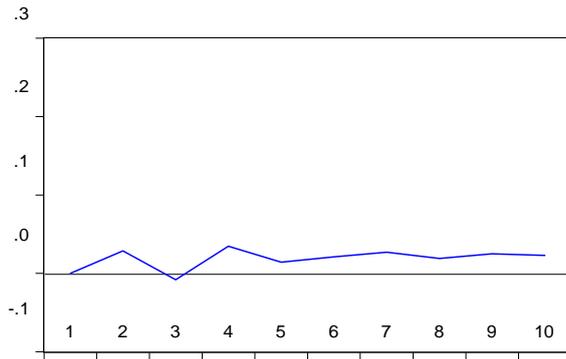
Source: Established by authors based on the Eveiws 9 program results

● **Gross Domestic Price Responses "Expo to GDP"**

Any change in the gross domestic product by one standard deviation will positively affect exports outside of hydrocarbons from the first period to the end of the third period, then decrease during the fourth and fifth periods, then return to the gradual escalation to reach its peak during the eighth period and go to almost stability during the last two periods, which are the ninth and tenth.

● **Exchange Rate Responses "EXPO to TOPEN"**

There is any change in the exchange rate, as shown in figure 5, which indicates the non-existent effect between exports and trade openness from the first period to the second one and then goes to the negative effect from the second period to the fourth period and it would remain volatile until it reaches stabilization during the last five periods. However, it would maintain its negative influence throughout the periods; this is due to the Algeria's control over its exchange rate and not leaving it free to be controlled by the supply and demand conditions. So this rate is always subject to censorship, despite the measures it interferes with (such as the devaluation of the currency several times like the most important one of the devaluation of the dinar by 40.17% during the economic stability program that Algeria knew from April 1, 1994 to March 31, 1995) but, it did not have a significant impact on improving the competitiveness of Algerian exports.

Conclusion and recommendations:

Promoting non-oil exports in light of the openness and foreign competition has become an urgent necessity to achieve self-sufficiency acceptable and stable growth rates which are capable of bringing the country out of the current underdevelopment and economic stagnation. In this perspective, the present study has examined this problem by using a VAR model in order to highlight the relationship between the studied variables measuring mainly the existence of a significant relationship between trade openness policies and non-hydrocarbon exports. Results confirm the existence of a positive long-term impact of trade openness on exports outside hydrocarbons through its positive impact on the economic growth rates in Algeria. We also explained the positive effect of the least impact on the exchange rate, as well as the negative impact of foreign investment on exports outside of hydrocarbons during the study period.

In order to activate and benefit from the exchange rate mechanisms, Algeria has to work seriously and seek to strengthen the competitiveness of the local product in the international markets and thus increasing the country's export activity. This can become true trough:

● Attracting real foreign investment from which expertise and technology can be used to increase national production and export to other countries.

- Encouraging Maghreb and Arab countries exchanges to expand the geographic a composition of national exports and find new strategic partners.
- Promoting strategies of exports to African countries. This is necessary to improve the quality of the Algerian product to compete with its counterpart in the world markets.
- Establishing industrial free zones to support exports outside hydrocarbon sector in particular, and foreign exchange in general in order to develop them more effectively.

Bibliography List:

Aljebrin, M. (2018). "Non-Oil Trade Openness and Financial Development Impacts on Economic Growth in Saudi Arabia". *International Journal of Economics and Financial , 8* (5), 251-260.

Bouklia-Hassan, R. (2013). "L'économie algérienne face à la diversification: quelles perspectives ?". *Les Cahiers du CREAD* (N° 105/106), 37-62.

Bouri, N. (2020). "Organisms for Development of SME in Algeria". *El-Wahat for Research and StudiesReview* , 1432-1459.

Capolupo, R., & Celi, G. (2008). "Openness and economic growth: A comparative study of alternative trading regimes" . *Économie internationale* (116), 5-35.

Gräbner, C., Heimberger, P., Kapeller, J., & Spri. (2020). "Understanding economic openness: a review of existing measures". *Review of World Economics* (157), 87–120.

Herzer, D., & Nowak-Lehnmann, F. (2016). "What does export diversification do for growth ? An econometric analysis". *Applied economics , 15* (38), 1825-1838.

Maliki, S. B., Si Mohamed, K., Hassaine, A., & Hartani, A. (2021)." Algeria's Economic Diversification and Economic Growth: An ARDL Approach Bound Testing". *Les Cahiers MECAS , 17* (1), 10-24.

Ouali, N., & Souman, M. (2018). "Diversification des exportations et croissance économique en Algérie". *Revue Des Etudes Economiques Approfondies*. (8).

World Bank Indicators Report, (2016).