
Determinants of growth in Algerian non-hydrocarbon exports during the period (1990-2023) An econometric study using the autoregressive distributed lag (ARDL) model

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Abstract:

The aim of this study was to identify the factors influencing the growth of Algeria's non-hydrocarbon export value during the period from 1990 to 2023, through an empirical analysis based on the (ARDL) methodology .

The measurement results indicated a long-term equilibrium relationship (cointegration) between Algeria's non-hydrocarbon exports and a set of explanatory variables included in the estimated model, namely: the real exchange rate, financial development, private domestic investment, government investment expenditure, and per capita GDP. A significant and positive relationship was recorded for these variables with the value of non-hydrocarbon exports from Algeria, except for the last two variables, which showed no significant effect due to the lack of significance in the relationship over both short and long terms, The short-term rate of correction of imbalances to return to balance reached 135% (less than a year). Furthermore, it was found that financial development is the most important determinant of the value of Algeria's non-hydrocarbon exports, followed by the real exchange rate and then private domestic investment in both the short and long terms.

Keywords: Exports; non-hydrocarbon exports; export diversification; Algeria; ARDL model.

Jel Classification Codes: C22,F13.

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1. Introduction:

The Throughout history, income growth has been a major concern for various countries and governments. Many theories have emerged to explain the sources of growth, along with numerous field experiments aimed at achieving the desired development. Regardless of their pros and cons, there is almost unanimous agreement on the importance and centrality of exports in this equation. In fact, exports of goods and services have become the mirror reflecting the development of a country's production volume, quality, and its competitiveness abroad. Moreover, exports have become the primary source for countries to acquire foreign currencies, improve foreign exchange reserves, and strengthen the value of their national currencies.

In developing countries like Algeria, exports play an extremely important role in forming the state's public revenues, from independence to the present day. They have also been and continue to be a driving force for development. However, exports are subject to fluctuations and instability due to the country's dependence on a single commodity, namely hydrocarbons (oil and gas). The value of total exports fluctuates with changes in the prices and quantities of this commodity, which has been a major challenge to the sustainability of development plans. The best example of this is the economic stagnation and the series of tough reforms Algeria went through during the 1980s and 1990s, aiming to find alternative sources of income beyond hydrocarbon exports.

In fact, since the early 2000s, Algeria has started seeking additional sources of income to supplement hydrocarbon revenues, in order to avoid the repercussions of economic stagnation, bankruptcy, and the debt trap. This led to the adoption of a new development model focused on economic diversification through revitalizing stagnant productive sectors such as agriculture, industry (both heavy and light), tourism, services, and others.

1.1. The Problematic:

In reality, in the last decade, Algeria has witnessed a certain level of growth in its non-hydrocarbon exports in terms of value and volume, driven by domestic production growth and the development of certain sectors such as extractive industries and agriculture. This growth has been influenced by a series of structural reforms and qualitative incentives provided by the government in various fields. This leads us to pose the following main question: What are the key factors determining the growth of Algeria's non-hydrocarbon exports between 1990 and 2023?

Additionally, this main question is supported by several sub-questions as follows:

- What is the state of Algeria's non-hydrocarbon exports during the period (1990-2023)?
- What is the nature of the relationship between non-hydrocarbon exports and the factors determining them during the period (1990-2023)?

1.2. Hypothèses of the Study :

- Despite the growth in their value, non-hydrocarbon exports still represent a small share of Algeria's total merchandise exports.
- Among the main factors determining non-hydrocarbon exports in Algeria during the study period (1990-2023), we find: Gross Domestic Product (GDP), real exchange rate, financial development, government investment spending, and private domestic investment.
- There is a long-term complementary relationship between non-hydrocarbon exports and the aforementioned determining factors in Algeria, where: GDP, government investment spending, private domestic investment, and financial development positively affect non-hydrocarbon exports, while the real exchange rate negatively affects them during the study period.

1.3. Importance and Objectives of the Study:

The importance of this study lies in the role that merchandise exports play in the Algerian economy, as they are the primary channel for obtaining foreign currency in the country and, consequently, for generating national income. However, what draws our attention to this topic is Algeria's heavy reliance on hydrocarbons, as well as its efforts to diversify exports to avoid the negative repercussions of this situation on its economy. This is being pursued through increasing non-hydrocarbon exports, especially considering that Algeria possesses productive capacities in other goods that can compete internationally, such as agriculture and manufacturing industries.

Thus, the goal of the study is to investigate the factors and elements that impact the growth of non-hydrocarbon export value in Algeria, in order to control and guide them in a way that ultimately increases the value of these exports. This will be achieved by constructing an econometric model that studies the nature of the relationship between the various relevant variables.

1.4. Methodology of the Study:

To answer the study's problematic, test the validity of the proposed hypotheses, and achieve the study's objectives, we first reviewed the literature related to the topic of Algeria's non-hydrocarbon exports using both the descriptive and analytical methods. Then, we moved to the practical side, where we relied on the quantitative method to study the nature of the relationship between the dependent variable (Algeria's non-hydrocarbon exports) and the independent variables, applying this analysis using the EViews-12 statistical software.

1.5. Previous Studies:

Many studies have addressed the topic of the determinants of merchandise exports for countries. However, few studies have focused specifically on the determinants of non-hydrocarbon exports, whether in Algeria or elsewhere. Below, we will highlight the key studies related to this topic:

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- **Chaabane Guessabi et al. (2023), titled: Determinants of Demand for Algerian Products outside the Hydrocarbon Sector during the Period 2000-2022.** This study aimed to identify the determinants of demand for Algerian products outside the hydrocarbon sector in international markets during the period (2000-2022), using the Vector Error Correction Model (VECM) to estimate the relationship and trends between the dependent variable (Algerian non-hydrocarbon exports) and the independent variables (GDP, exchange rate, trade balance, government spending, oil price). The study found a statistically significant unidirectional causal relationship from government spending to non-hydrocarbon exports, from the trade balance to oil prices, and from the trade balance to the exchange rate. Additionally, a long-term equilibrium relationship was identified between the study variables, with the gap between the equilibrium values and actual values of the dependent variable being corrected at a speed of 39.32% annually, or about two and a half years (Guessabi, Saib, madjdoubi, & zidelmelaffane, 2023, p. 805).
- **Keddari Nassim & Touati Karima (2023), titled: Short- and Long-Term Determinants of Export Diversification in Algeria: ARDL Model (1995-2020).** This study aimed to analyze the determinants of Algeria's export diversification during the period (1995-2020) using the Autoregressive Distributed Lag (ARDL) model. The study concluded that GDP, terms of trade, and the degree of investment freedom had a significant negative impact on export diversification in Algeria during the study period. Additionally, it found a long-term equilibrium relationship between the dependent variable and all the explanatory variables (Touati & Keddari , 2023, p. 61).
- **Kwabena A. Anaman & Tuty Mahmud (2023), titled: Determinants of Supply of Non-Oil Exports in Brunei Darussalam.** This study aimed to determine the factors influencing the supply of non-oil exports in Brunei Darussalam during the period (1961-2000), covering the transition from low-income agricultural-based countries to high-income modern countries based on oil and gas production as the main driver of economic growth. The ARDL methodology was used, and the study found that real wage rates and the ratio of oil exports to GDP significantly affected the supply of non-oil exports. It also found that government export promotion policies and infrastructure improvements had a positive and significant effect on the same supply. Furthermore, a long-term equilibrium relationship between the dependent variable and the explanatory variables was identified, with deviations from actual values relative to equilibrium values being corrected at a rate of 57.1% annually, or within approximately 1.75 years (Anaman & Tuty , 2003, p. 144).
- **Lynda Hassan (2022), titled: Determinants of Algeria's Export Competitiveness in the Context of Economic Globalization.** This study aimed to measure and analyze the factors determining the competitiveness of Algeria's non-hydrocarbon exports during the period (1980-2018) using an econometric model (Error Correction Model). The study revealed a long-term equilibrium relationship between the

explanatory variables and the dependent variable. It also showed a positive and significant relationship between GDP, foreign direct investment inflows, innovation, human capital, and non-hydrocarbon exports, while a negative relationship was found between the real exchange rate and the dependent variable (Hassan, 2022, pp. 219-225).

- **Zineb Himer et al. (2021), titled: Determinants of Agricultural Exports in Algeria: An Econometric Study for the Period (1987-2018).** This study aimed to estimate the factors affecting the growth of Algeria's agricultural exports during the above period using the ARDL model. The study identified several explanatory variables that had a positive and significant effect on Algeria's agricultural exports, including agricultural production, the exchange rate, and oil prices. Meanwhile, trade openness had a negative and significant effect, and no significant relationship was found with inflation (Haimar, Mhireg, & Hazla, 2021, p. 144).
- **Anmar Amin Al-Brawari & Qahtan Diab Salman (2019), titled: Determinants of Industrial Exports in China for the Period (1989-2016).** This study aimed to estimate and analyze the impact of economic variables on China's industrial exports during the specified period using the multiple regression model. The study found a positive and significant relationship between China's industrial exports and the explanatory variables: industrial output and value-added industrial production/GDP. However, a negative and significant relationship was found with the exchange rate and population growth (Al-Barwari & Qahtan, 2019, p. 271).
- **Nashwa Mustafa Ali Mohamed & Manal Kamaluddin Mohamed Al-Tayeb (2019), titled: Identifying the Determinants of Service Exports in the Kingdom of Saudi Arabia Using Factor Analysis.** This study aimed to identify the factors influencing the growth of service exports in Saudi Arabia during the period (1975-2014). To achieve this, the researchers used factor analysis, multiple regression, and stepwise regression techniques. The study concluded that financial development, domestic investment, value-added agriculture and services, human capital development, and communication infrastructure had a positive effect on service exports. On the other hand, oil revenues and the domestic savings ratio had a negative impact. Human capital development and financial development were found to be the most important determinants (Mustafa Ali Mohamed & Kamal Eldin Mohamed El-Tayeb, 2019, p. 177)
- **Brawin Chorzadeh (2018), titled: Determinants of Industrial Exports: An Econometric Study of Algeria (1980-2016).** This study aimed to identify and measure the impact of economic factors on the growth of Algeria's industrial exports during the specified period using causality testing, cointegration, and error correction modeling. The study found a unidirectional causal relationship from the explanatory variables to the dependent variable. The study also revealed a positive effect of GDP, foreign direct investment inflows, and the exchange rate on Algeria's industrial exports, with GDP having the strongest effect. Additionally, a long-term equilibrium relationship between the explanatory variables and the dependent variable was found. The speed

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of adjustment for deviations between actual and equilibrium values of the dependent variable in the short run was 69% annually, or 1.45 years (Berwain, 2018, p. 154).

From the above studies (which were accessible), it is evident that there are some similarities between these studies and our current study, particularly in terms of the goal of identifying the key factors that influence and determine the evolution of exports in countries. However, there are also many differences, as most of the studies focus on the overall exports of a country or a specific type of goods (industrial, agricultural, etc.), except for two studies: one on Algeria and one on Brunei Darussalam, which addressed non-hydrocarbon exports. There are also differences in terms of the time and geographical scope, as well as the variables included in the econometric models. In this study, we attempted to expand and update the time series as much as possible to keep up with developments in the subject of study.

2. The Reality of Algerian Exports Outside the Hydrocarbon Sector:

The reality of Algerian exports outside the hydrocarbon sector can be assessed by tracking the evolution of their value over the study period (1990-2023) and analyzing their contribution to improving their share of total commodity exports, thus demonstrating their economic significance. Additionally, the study examines and analyzes the commodity structure of these exports, the evolution of their shares, as well as their geographical distribution, particularly in recent years.

By examining and analyzing these indicators, it becomes possible to understand the general trends of Algerian exports outside hydrocarbons and the developments they have undergone in order to evaluate the economic diversification strategy adopted by the state.

2.1. Evolution of the Volume of Algerian Exports outside Hydrocarbons (1990-2023):

Table No. (01) Presents the various developments in total Algerian exports according to their main components, which are divided into hydrocarbon exports and non-hydrocarbon exports.

Total Algerian exports, in all their components, have experienced numerous fluctuations in growth over the period (1990-2023). These fluctuations (increases and decreases in value) appear to be consistent between total exports and hydrocarbon exports. However, there are some differences between them and the value of non-hydrocarbon exports in certain periods, whether in terms of the rate of increase or decrease, or in terms of the growth trend. The level of increase in the value of these exports has had an impact on improving or reducing their share of total exports, despite their relatively small contribution.

During the 1990s, following the decision for partial trade liberalization, the abolition of state monopoly, and the devaluation of the currency starting in 1991, non-hydrocarbon exports experienced some growth in 1992-1993. However, they declined again in 1994, recording their largest drop at -47%, compared to -13% for hydrocarbon exports. In the following year (1995), non-hydrocarbon exports saw a record growth rate of 89%,

far exceeding the 13% growth rate of hydrocarbon exports. This coincided with the second decision to fully liberalize foreign trade in accordance with the International Monetary Fund’s directives and the removal of the list of banned export goods in 1996. Additionally, Algeria settled its debt with Russia by exporting a range of goods such as wines, canned tomatoes, and dates. However, after the completion of this deal, the value of these exports declined again in 1998 (Hassan, 2022, pp. 197-180), marking the second largest drop of the period at -42%, alongside a decrease in hydrocarbon exports, albeit to a lesser extent. This decline was due to the economic recession Algeria was experiencing as a result of falling oil prices, shrinking revenues, and the country's entry into a series of severe contractionary economic reforms aimed at stimulating domestic production and developing non-hydrocarbon exports to compensate for hydrocarbon losses and pay off external debt. The highest share of non-hydrocarbon exports was recorded in 1995 at 5.2% of total exports. On average, during the period (1990-1999), non-hydrocarbon exports recorded a positive growth rate of 6% (higher than hydrocarbon exports at 4.5%) and an average share of 4.2% of total exports.

At the beginning of the 2000s, the total value of Algeria’s commodity exports increased, with non-hydrocarbon exports achieving a positive growth rate of 40% following the previous setback. In the following years, non-hydrocarbon exports recorded increasing positive growth rates, notably in 2006 at 53%. However, there were also some declines in 2003 and 2007, with the most significant drop occurring in 2009 at -45%, which also affected hydrocarbon exports to the same extent. This coincided with the global financial crisis of 2008, which developed into a broader economic crisis affecting all sectors of production and trade, leading to a significant economic downturn and a decline in global demand for various goods and services. As a result, exports from many countries, including Algeria, declined. Overall, during the period (2000-2009), non-hydrocarbon exports recorded an average growth rate of +11.5% and an average share of 2% of total exports, which was lower than the average growth rate of hydrocarbon exports (+18.7%) and their average share of 98%.

Table N°1: Evolution of the Volume of Non-Hydrocarbon Exports in Algeria (1990-2023)

Unit (Million Dollars - %)

Years	Total Exports	Hydrocarbon Exports		Non-Hydrocarbon Exports	
		Value	Share (%)	Value	Share (%)
1990	12880	12350	95,9	530	4,1
1991	12440	11970	96,2	470	3,8
1992	11510	10980	95,4	530	4,6
1993	10410	9880	94,9	530	5,1
1994	8890	8610	96,9	280	3,1
1995	10260	9730	94,8	530	5,2
1996	13220	12650	95,7	570	4,3
1997	13820	13180	95,4	640	4,6
1998	10140	9770	96,4	370	3,6

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1999	12320	11910	96,7	410	3,3
2000	21650	21060	97,3	590	2,7
2001	19090	18530	97,1	560	2,9
2002	18719	18109	96,7	610	3,3
2003	24465	23993	98,1	472	1,9
2004	32220	31550	97,9	670	2,1
2005	46330	45590	98,4	740	1,6
2006	54740	53610	97,9	1130	2,1
2007	60590	59610	98,4	980	1,6
2008	78589	77194	98,2	1395	1,8
2009	45186	44415	98,3	771	1,7
2010	57090	56121	98,3	969	1,7
2011	72888	71661	98,3	1227	1,7
2012	71736	70583	98,4	1153	1,6
2013	64867	63816	98,4	1051	1,6
2014	60129	58462	97,2	1667	2,8
2015	34565	33081	95,7	1485	4,3
2016	29309	27918	95,3	1391	4,7
2017	34569	33202	96,0	1367	4,0
2018	41146	38897	94,5	2249	5,5
2019	35323	33244	94,1	2079	5,9
2020	21932	20016	91,3	1916	8,7
2021	38637	34058	88,1	4579	11,9
2022	65718	59738	90,9	5980	9,1
2023	65526	59548	90,9	5978	9,1

Source: Prepared by the researcher, based on the reports of the Bank of Algeria (1990-2023).

During the period (2010-2023), non-hydrocarbon exports resumed their growth, starting in 2010 and continuing into 2011, coinciding with the initial recovery of the global economy from the previous financial crisis. However, these exports declined again in 2012-2013. At the beginning of 2014, they rebounded with a significant growth rate of 59%, remaining unaffected by the sharp drop in hydrocarbon prices (which fell by nearly half) that year, a decline that led to a decrease in hydrocarbon exports for oil-producing countries, including Algeria.

In 2015, non-hydrocarbon exports also experienced a decline of 11%. However, they recovered again from 2016 to 2018 before experiencing two consecutive declines in 2019 and 2020, primarily due to the global pandemic (COVID-19). The pandemic caused the suspension of numerous economic activities worldwide, leading to a major economic downturn, including a slowdown in global trade and exports.

At the beginning of 2021, Algeria's non-hydrocarbon exports recorded an unprecedented growth rate of 139%, increasing in value from \$1.9 billion to \$4.6 billion. This growth outpaced hydrocarbon exports, which

registered a lower growth rate of 70%(Al-Mayhoob & Ouyaba, 2024, p. 286). This strong performance continued until 2023.

The significant growth of non-hydrocarbon exports in this period can be attributed to two key factors:

- The recovery in global demand for various goods and services as the pandemic subsided and economic activities resumed.
- Algeria’s increased export capacity for non-energy products, particularly semi-manufactured goods, which accounted for the largest share (77%) of non-hydrocarbon exports. These products included fertilizers, oils, iron, cement, and more. Additionally, food products contributed 12%, while raw materials such as phosphate also played a role.(Algeria, 2022,2023,2024).

This growth was largely driven by government efforts to enhance domestic production and diversify exports through various forms of support and incentives for investors across different sectors. As a result, the share of non-hydrocarbon exports in total exports rose to 12% in 2021 before declining to 9% by the end of 2023.

Overall, during the period (2010-2023), non-hydrocarbon exports achieved an average growth rate of 21% and an average share of 5.2%, compared to an average growth rate of 7.3% and a share of 95% for hydrocarbon exports.

In reality, the performance of Algeria’s non-hydrocarbon exports in recent years has been remarkable compared to hydrocarbon exports. While both types of exports have experienced growth in value, the growth rate of non-hydrocarbon exports was significantly higher than that of hydrocarbon exports (notably in 2018 and 2021). Conversely, during periods of decline, the drop in non-hydrocarbon exports was much less severe than that of hydrocarbon exports (notably in 2015 and 2016), as illustrated in the following table:

Table N° 2: Growth Rate of Algeria’s Export Components (2014-2022)

Years	Hydrocarbon Exports	Non-Hydrocarbon Exports
2014	-8,4	+58,7
2015	-43,4	-11,0
2016	-15,6	-6,3
2017	+18,9	-1,7
2018	+17,2	+64,6
2019	-14,5	-7,6
2020	-39,8	-7,8
2021	+70,2	+138,9

Source: Prepared by the researcher based on Table No. 01.

This phenomenon can be explained by the diversity of the commodity composition of each type of exports, which helps maximize benefits when prices rise and minimize losses when they fall. This implies that the

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product diversification of non-hydrocarbon exports—despite their small share in Algeria's total exports—contributes to increasing their financial value when prices or quantities rise. In contrast, when exports are concentrated in a single commodity, such as hydrocarbons, the benefits of rising prices or quantities remain limited to that one product. More critically, a decline in prices or quantities would lead to greater losses, as the export mix consists solely of hydrocarbons, with no other commodities available to offset the losses. Therefore, Algeria's strategy for diversifying its export structure becomes more than necessary to maximize benefits and advantages while minimizing risks and losses.

2.2. The Evolution of the Structure of Algeria's Non-Hydrocarbon Exports

To fully understand the previous developments in the value of Algeria's non-hydrocarbon exports, it is essential to delve deeper into the analysis of this growth by examining the evolution of the commodity structure of these exports and identifying the leading products. This will then be followed by an analysis of the geographical distribution of these exports in international markets to determine whether Algeria has diversified its economic partners.

2.2.1. Evolution of the Commodity Structure

Table No. (03) Illustrates the evolution of the value and share of the commodity components of Algeria's non-hydrocarbon exports during the study period. Notably, semi-manufactured products have dominated the total share, increasing over time and reaching their peak in 2022-2023 with shares of 87.5% and 83%, respectively. This was driven by record values of approximately \$5.1 billion and \$4 billion, achieving a remarkable growth rate of 1,785% compared to 1990, when their value did not exceed \$211 million, with a share of 49%.

This growth is primarily attributed to the diversification of exports within this category. In addition to traditional products such as chemical fertilizers, ammonia, urea, and oils, recent years (2021-2022-2023) have seen the export of new products such as cement, iron, and steel, which accounted for the majority of the increase in the value of semi-manufactured exports (Algeria, 2023, pp. 86-87).

However, a key drawback of this export segment is its strong dependence on hydrocarbons, as many of these products are derivatives of oil and gas. Consequently, they are highly sensitive to fluctuations in global hydrocarbon prices, particularly fertilizers, whose production costs are approximately 80% dependent on natural gas.

Table N°3: Evolution of the Commodity Structure of Algeria’s Non-Hydrocarbon Exports (1990-2023)

Unit: Million Dollars - %

Products	Semi-Manufactured Products		Food Products		Raw Materials		Industrial Equipment Goods		Non-Food Consumer Goods		Agricultural Equipment Goods	
	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share
1990	211	48,06	50	11,39	32	7,29	76	17,31	67	15,26	3	0,68
1995	274	53,83	110	21,61	41	8,06	18	3,54	61	11,98	5	0,98
2000	465	75,98	32	5,23	44	7,19	47	7,68	13	2,12	11	1,80
2005	651	71,78	67	7,39	134	14,77	36	3,97	19	2,09	-	-
2010	1056	69,20	315	20,64	94	6,16	30	1,97	30	1,97	1	0,07
2014	2121	82,15	323	12,51	109	4,22	16	0,62	11	0,43	2	0,08
2015	1597	81,11	235	11,93	106	5,38	19	0,96	11	0,56	1	0,05
2016	1321	73,19	327	18,12	84	4,65	54	2,99	19	1,05	-	-
2017	1410	73,06	349	18,08	73	3,78	78	4,04	20	1,04	-	-
2018	1626	73,41	373	16,84	93	4,20	90	4,06	33	1,49	0	0,00
2019	1445	69,87	408	19,73	96	4,64	83	4,01	36	1,74	0	0,00
2020	1287	67,41	437	22,89	71	3,72	77	4,03	37	1,94	0,3	0,02
2021	3490	77,57	576	12,80	182	4,05	171	3,80	79	1,76	1	0,02
2022	5086	87,46	269	4,63	263	4,52	84	1,44	111	1,91	2	0,03
2023	3977	83,31	428	8,97	256	5,36	45	0,94	65	1,36	3	0,06

Source: Prepared by the researcher based on the reports of the Bank of Algeria (1990-2023).

In second place, we find food products. Although they competed with raw materials during the period (2000-2005), their dominance began to emerge in 2010 and continued until the end of the period. They recorded their highest value of \$576 million in 2021, with a share of 12.8%, compared to a value of \$50 million and a share of 11.4% in the base year. This reflects the state's efforts to develop the agricultural sector and increase food availability. Despite their value increasing more than tenfold throughout the study period, their share did not grow significantly due to the considerable growth in the value of semi-manufactured products. The main exported food products include sugar (in large quantities), followed by dates, figs, pasta, beverages, and vegetables.

In third place are raw materials. Although they recorded low levels before 2000 and were outperformed by industrial equipment goods and non-food consumer goods, they began to show higher figures after this year and continued growing until the end of the study period. They recorded their highest value in 2022, reaching \$263 million with a share of 4.5%, compared to a value of only \$32 million and a share of 7% in earlier years, marking a growth rate of 722% over this period. This growth was driven by an increase in the number of products in this category, primarily phosphate, cardboard, copper, and zinc (Algeria, 2023, pp. 86-87).

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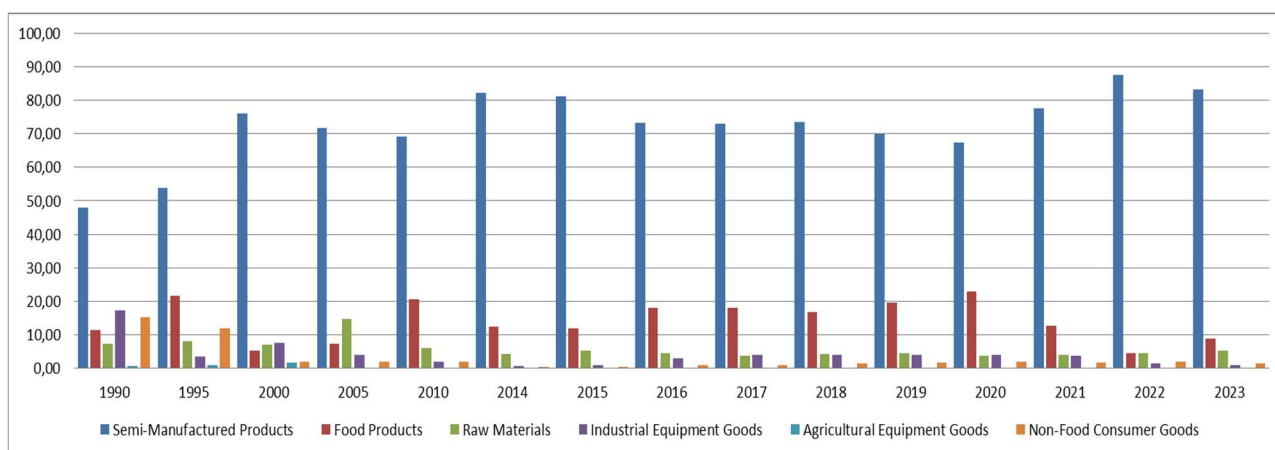
In fourth place are industrial equipment goods, which experienced fluctuations in value throughout 1990-2014. However, they started to rise gradually afterward, reaching their peak in 2021 at \$171 million, with a share of nearly 4%. Nevertheless, their value gradually declined thereafter, registering a growth rate of only 125%, a relatively low figure over such a long period. Examples of these products include construction and public works equipment, healthcare equipment, and mechanical components.

In fifth place, and second to last, are non-food consumer goods. These also saw fluctuations in value throughout 1990-2014 before experiencing steady and gradual growth. They reached their highest value of \$111 million in 2022, recording a modest growth rate of 80%. This resulted in their share of total exports declining from 15% in 1990 to just 2% in 2022. Key products in this category include pharmaceuticals, cleaning products, and cosmetics (Moumen, 2023, p. 157).

Finally, in sixth place are agricultural equipment goods, which have always had a marginal presence in Algeria's non-hydrocarbon exports. Their highest recorded value was \$11 million in 2000, followed by a gradual decline, eventually disappearing entirely in 2018-2019 before rebounding in 2020 and continuing to grow. However, their share of total exports remains extremely low, not exceeding 0.06%.

Despite government efforts to boost non-hydrocarbon exports, their growth indicators remain below the desired level due to several factors. These include weak economic activity in non-hydrocarbon production, low competitiveness of the national economy in terms of exportable goods and services (Bouhitm & Jomani, 2020, p. 185), and non-economic factors such as bureaucracy, regulatory frameworks, and logistical challenges such as transportation.

FigN°01: Evolution of the Share of Non-Hydrocarbon Export Goods in Algeria (1990-2023)



Source: Prepared by the researcher based on Table No. 03.

2.2.2. Evolution of the Geographical Structure:

The geographical distribution of Algeria's non-hydrocarbon exports is almost identical to the geographical distribution of total exports, with the only difference being the ranking of these countries across different types of exports.

Table N°4: The Top Ten Customers for Algeria's Non-Hydrocarbon Exports (2019-2022) Unit: Million DA.

1992		2000		2010		2015	
country	Value	country	Value	country	Value	country	Value
(CIS)	2755.7	Spain	9597.3	Spain	22350	Spain	41626
France	1728.1	France	7557.7	France	16664	France	35091
Italy	1273.9	Italy	6862.1	Netherlands	12565	Netherlands	25851
Spain	660.3	Portugal	3873.4	Italy	8796	Italy	15800
Netherlands	544.5	Netherlands	3719.3	Belgium	8151	Turkey	8731
Morocco	508.7	Iraq	2024.3	Syria	5530	Britain	6296
Thailand	382.8	Tunisia	1928.1	Tunisia	4470	Tunisia	6020
Bulgaria	354.4	Belgium	1703.3	Sudan	3901	Germany	5887
Tunisia	273.1	USA	1224.8	Turkey	2577	Brazil	5870
USA	239.4	Switzerland	1154.5	Libya	2287	Portugal	3940

2020		2021		2022	
country	Value	country	Value	country	Value
Brazil	41252	USA	84609	France	112060
France	38852	France	79799	Netherlands	106898
Spain	26723	Spain	68366	USA	77731
Netherlands	18333	Brazil	65581	Belgium	64327
USA	17001	Turkey	43911	Italy	63366
Turkey	10921	Netherlands	42485	Spain	49651
Tunisia	10525	Belgium	34552	Brazil	44409
Argentina	8203	India	22580	India	41574
Jordan	7845	Italy	20931	Turkey	29940
Mexico	7355	Tunisia	17376	Germany	29560

(CIS): The Commonwealth of Independent States was established in December 1991 by eleven countries from the former Soviet Union: Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Uzbekistan, Russia, Tajikistan, Turkmenistan, and Ukraine.

Source: Prepared by the researcher, based on:

- Office National des Statistiques (2017), La Direction Technique Chargée de la Comptabilité Nationale, EVOLUTION DES ECHANGES EXTERIEURS DE MARCHANDISES DE 2011 A 2016, Alger, p : 87.
- Office National des Statistiques (2015), La Direction Technique Chargée de la Comptabilité Nationale, EVOLUTION DES ECHANGES EXTERIEURS DE MARCHANDISES DE 2004 A 2014, Alger, p : 153.
- Office National des Statistiques, Collections Statistiques N° 233 : Evolution des échanges extérieurs de marchandises de 2017 à 2022, Alger, p : 88.
- Office National des Statistiques, Les premiers clients de l'Algérie pour les produits hors hydrocarbures de 1992-2006, Alger, p : 1-3.

After the leadership of the Commonwealth of Independent States (some former Soviet Union countries) during the first half of the 1990s, we witnessed the gradual rise of European Union countries, which occupied the top ranks throughout the study period, especially: France, Spain, followed by Italy, the Netherlands, and Belgium. This trend continued until the end of the period (2022).

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In second place, we find some countries from the Maghreb and Arab region such as Tunisia, Morocco, Iraq, Jordan, and Syria, but their share began to decline after 2010 in favor of new European countries such as Turkey, the UK, and Germany.

It is noticeable that after 2015, the role of countries from North America (the USA and Mexico) and Latin America, such as Argentina, Mexico, and Brazil, grew significantly. Brazil led in 2020, followed by the United States in 2021, surpassing Algeria's historical customers (European Union countries). We also recorded the emergence of new customers for Algeria's non-hydrocarbon exports, particularly from Asia, such as India, and the return of Tunisia.

In 2022, we observed the return of leadership by European countries like France and the Netherlands. The United States maintained an important third position overall, followed by countries such as Belgium, Italy, Spain, Brazil, India, and finally Turkey and Germany.

Overall, the European Union region remains the primary customer for Algeria's non-hydrocarbon exports, with semi-manufactured products taking the largest share, followed by agricultural products and then fishery products. In second place are the Americas, particularly the United States, similar to the pattern observed in total exports. This highlights the role of regional agreements in shaping Algeria's foreign trade, both in terms of exports and imports.

Algeria has had an economic partnership agreement with the European Union since 2005, allowing its goods to enter EU markets with preferential tariff advantages (Bekach, 2024, pp. 339-343). However, these exports remain significantly low compared to imports from the EU. Consequently, Algeria seeks to renegotiate the terms of the agreement as soon as possible to maximize the expected benefits by expanding tariff exemptions to include more competitive Algerian goods and providing support to enhance exports, thereby achieving a better balance with imports ((APS), 2025).

3. Applied Study:

This study aims to estimate and measure the impact of key factors determining and influencing the value of Algeria's non-hydrocarbon exports for the period (1990-2023) by constructing an econometric model based on the ARDL (Autoregressive Distributed Lag) methodology. The estimation is conducted using the statistical software Eviews-12, following these steps:

3.1. Methodology and Tools:

The methodology and tools used in this study can be explained as follows:

- **Study Approach:** This study employs the Autoregressive Distributed Lag (ARDL) approach to test the cointegration between the study variables. The ARDL model was introduced by Pesaran & Shin (1999) and later expanded by Pesaran et al. (2001). It combines both the Distributed Lag Model and the Autoregressive

Model and is considered one of the most effective econometric techniques for testing cointegration, outperforming other methods such as: The Engle-Granger Two-Step Method, The Johansen Cointegration Test within the Vector Autoregression (VAR) framework, The ARDL methodology offers several advantages: (AFZAL, EHSAN MALIK, BUTT, & KALSOOM, 2013, p. 25)

- It is relatively robust in small sample sizes ranging between 30-80 observations.
- It can be applied regardless of whether the time series variables are integrated of order $I(0)$, $I(1)$, or a mixture of both, provided that no variable is integrated of order $I(2)$ or higher.
- It follows a general-to-specific modeling approach by including sufficient lag lengths to capture the data generation process, with model selection based on various statistical criteria (AIC, SIC, HQC).
- It allows for the simultaneous estimation of long-run and short-run relationships through the Unrestricted Error Correction Model (ARDL-UECM) instead of separate equations.

3.2. Study Variables and Data Sources:

To measure and identify the factors affecting Algeria's non-hydrocarbon exports, several independent variables were selected based on economic theory and previous studies. The selection was limited to variables with available data, which include:

- **LEXP**: The logarithm of non-hydrocarbon export value in Algeria. This is the dependent variable, reflecting the country's economic strength and international competitiveness through the demand for its exported goods and services.
- **LGDP**: The logarithm of real GDP per capita, serving as an indicator of economic growth. GDP per capita is a more precise explanatory variable than total GDP. According to economic theory, it is expected to have a positive impact on non-hydrocarbon exports, as higher income levels stimulate economic dynamism, increase demand and investment, boost production, and generate exportable surpluses.
- **LEXR**: The logarithm of the real exchange rate of the US dollar against the Algerian dinar. This explanatory variable plays a crucial role in stimulating exports, particularly in developing countries. During economic reforms, many nations have devalued their local currencies to encourage exports. According to economic theory, a negative relationship is expected between this variable and Algeria's non-hydrocarbon exports.
- **LFI**: The logarithm of the Composite Financial Development Index is an explanatory variable that illustrates the level of financial development attained by a country's economy. It is composed of several indicators reflecting factors such as the number of active financial institutions in the country, the volume of savings, the amount of credit granted to the private sector, the diversity of financial services provided, public access to various financial services, the legal and regulatory environment, and more. A rise in this index indicates a strengthening and deepening of financial services to efficiently and effectively meet the needs of economic

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units, thereby supporting and stimulating economic growth (Ben Qana & Boughzala, 2015, pp. 266-268), It also signifies an increased capacity of the financial system to transfer funds from surplus entities to deficit entities, thus achieving economic recovery and boosting investment and production across various sectors (industry, agriculture, services, etc.), ultimately generating exportable production surpluses.

- **LGIS:** The logarithm of government investment expenditure, reflecting the government's spending on investment goods, particularly infrastructure development (ports, airports, roads, bridges, dams, hospitals, educational and vocational institutions, universities, administrative buildings, etc.). Infrastructure investments create a favorable business environment, attract economic actors and investors, and are theoretically expected to have a positive effect on exports.
- **LPDI:** The logarithm of private domestic investment, a crucial explanatory variable in modern economies. With economic liberalization and the adoption of a market economy, the private sector has become the primary driver of economic growth through investment and financing across various sectors. The private sector is known for its efficient resource utilization compared to the public sector and its competitive ability in international markets. Consequently, this variable is expected to contribute positively to export growth (Ben Shikh, 2017, pp. 587-588).

The data for these variables were sourced from both domestic and international databases, including:

- The World Bank (Real GDP per capita, Real Exchange Rate of USD to Algerian Dinar).
- The African Development Bank (Private Investment).
- The Bank of Algeria (Non-Hydrocarbon Exports, Financial Development).
- The National Office of Statistics & the Ministry of Finance (Government Investment Expenditure).

This study covers the period 1990-2023, as it represents the longest available dataset for the selected variables.

The econometric model is expected to take the following form:

$$\begin{aligned} \Delta LEXPHH_t = & \alpha_0 Lexp_{hh} + \sum_{i=1}^p \beta_{1i} \Delta LEXPHH_{t-1} + \sum_{i=1}^q \beta_{2i} \Delta LECH_{t-1} + \sum_{i=1}^q \beta_{3i} \Delta LFD_{t-1} + \sum_{i=1}^q \beta_{4i} \Delta LGIS_{t-1} \\ & + \sum_{i=1}^q \beta_{5i} \Delta LPDI_{t-1} + \sum_{i=1}^q \beta_{6i} \Delta LGDPPC_{t-1} + \theta_1 LEXPHH_{t-1} + \theta_2 LECH_{t-1} + \theta_3 LFD_{t-1} + \theta_4 LGIS_{t-1} \\ & + \theta_5 LPDI_{t-1} + \varepsilon_t \end{aligned}$$

Where:

- Δ : First difference operator,
- α_0 : Constant term,
- β_i : Short-run coefficients,
- θ_i : Long-run coefficients,
- ε : Random error term.

4. Results and discussion:

4.1. Time Series Stationarity Test:

To examine the stationarity of the time series variables in the study model and determine their order of integration, it is necessary to conduct a **unit root test**. For this purpose, the **Augmented Dickey-Fuller (ADF) test** was employed. The following table presents the test results:

Table N° 5: Unit Root Test Results for Stationarity

ADF Test – Variables						
Model	Model 1		Model 2		Model 3	
Variable	Level	First Difference	Level	First Difference	Level	First Difference
LEXP HH	-0.54 (0.86)	-7.59 (0.00)	-4.30 (0.009)	-7.78 (0.00)	1.54 (0.96)	-6.48(0.00)
LGIS	-2.55 (0.11)	-4.34 (0.0018)	-1.96 (0.59)	-4.41 (0.0073)	1.62 (0.97)	-3.90 (0.0003)
LEXCH	-2.51 (0.12)	-3.20 (0.02)	-2.47 (0.337)	-3.56 (0.04)	1.67 (0.97)	-2.83 (0.006)
LFD	-2.58 (0.10)	-5.07(0.0003)	-3.90 (0.02)	-5.03 (0.0016)	0.005 (0.67)	-5.17 (0.00)
LGDP PC	-2.22 (0.20)	-5.75 (0.00)	-1.49 (0.81)	-6.5 (0.00)	1.83 (0.98)	-4.81 (0.00)
LPDI	-0.61 (0.85)	-3.67 (0.01)	-2.05 (0.54)	-3.66 (0.04)	0.63 (0.11)	-3.55 (0.001)

Note: Values in parentheses represent p-values.

Source: Prepared by the researcher, based on Eviews 12.

From the table above, it is evident that the time series of the model variables are not stationary at the level but become stationary after taking the first difference at all significance levels (1%, 5%, and 10%). Accordingly, these results allow us to use the ARDL approach to study the long-run equilibrium relationship between the variables.

4.2. Bounds Test:

To determine the existence of a long-run equilibrium relationship between the variables, the Bounds Test for Cointegration was conducted. As shown in Table 6 below, the calculated F-statistic (F = 4.30) is greater than all upper bounds. Therefore, the null hypothesis, which states that there is no long-run relationship between the variables, is rejected. This confirms the presence of a long-run equilibrium relationship.

Table N° 6: Bounds Test for Cointegration

ARDL Bounds Test		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	k
F-statistic	4.030188	5
Critical Value Bounds		
Significance	10 Bound	11 Bound
10%	2.26	3.35
5%	2.62	3.79

Source: Prepared by the researcher, based on EViews 12.

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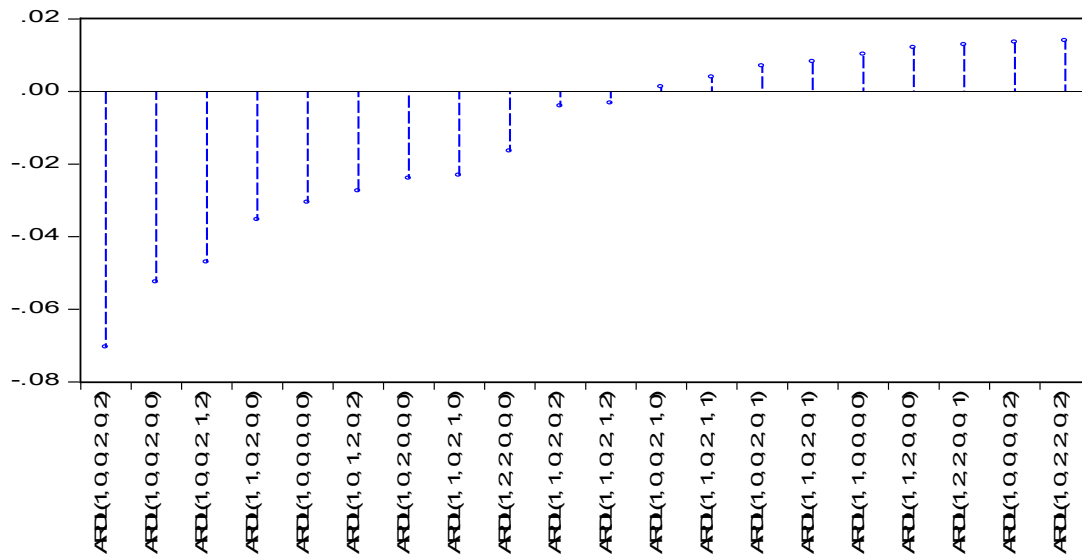
4.3. Cointegration Test Using the ARDL Approach:

After conducting the preliminary tests, the remaining steps of the ARDL methodology are completed, starting with determining the optimal lag length, estimating the model, and finally evaluating it statistically and econometrically.

4.3.1. Determining the Optimal Lag Length:

To determine the optimal distributed lag length (n), two common criteria are used: Akaike Information Criterion (AIC) and Schwarz Criterion (SC). The optimal lag length is selected based on the lowest value of AIC or SC. As shown in Figure 2 below, and based on the AIC criterion, the optimal lag length and the best-selected model is ARDL(1,0,0,2,0,2).

FigN°2: Optimal Lag Length Selection Results
Akaike Information Criteria (top 20 models)



Source: Prepared by the researcher, based on Eviews 12.

4.3.2. Model Estimation:

Estimating the model using the ARDL approach provided the results presented in Table 7 below:

Table N°7: Estimation Results Using the ARDL Method

Dependent Variable: LEXPHH				
Method: ARDL				
Dynamic regressors (2 lags, automatic): LEXCH LFD LGIS LPDI LGDPPC				
Fixedregressors: C				
Number of modelsevaluated: 243				
Selected Model: ARDL(1, 0, 0, 2, 0, 2)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LEXPHH(-1)	-0.353244	0.238027	-1.484047	0.1561
LEXCH	0.687220	0.321310	2.138803	0.0473
LFD	1.706739	0.621285	2.747109	0.0138
LGIS	0.323021	0.288855	1.118283	0.2790

LGIS(-1)	0.330264	0.239926	1.376524	0.1865
LGIS(-2)	-0.448409	0.223567	-2.005699	0.0611
LPDI	0.418006	0.157754	2.649733	0.0168
LGDPPC	-0.676531	0.200224	-3.378872	0.0036
LGDPPC(-1)	-0.006720	0.185651	-0.036196	0.9715
LGDPPC(-2)	0.346079	0.209488	1.652021	0.1169
C	7.406321	1.902514	3.892912	0.0012
R-squared	0.910854	Meandependent var		6.673394
Adjusted R-squared	0.858416	S.D. dependent var		0.537911
S.E. of regression	0.202404	Akaike info criterion		-0.070382
Sumsquaredresid	0.696443	Schwarz criterion		0.452984
Log likelihood	11.98535	Hannan-Quinn criter.		0.089616
F-statistic	17.36989	Durbin-Watson stat		2.152367
Prob(F-statistic)	0.000001			

Source: Prepared by the researcher, based on Eviews 12.

From the table above, it is evident that the explanatory variables affecting the dependent variable (non-hydrocarbon exports in Algeria) at different lag periods include LEXCH, LPDI, LGIS (-2), LFD, and LGDPPC. The obtained results also indicate that the independent variables collectively influence the dependent variable, as confirmed by the F-test. These findings align with reality, as many phenomena do not respond to their determinants instantaneously but rather result from historical accumulations. This explains why the coefficient of determination (R²) is sufficiently high, explaining 91.08% of the model.

4.3.3. Error Correction Model Estimation:

The results of the Error Correction Model (ECM) estimation are presented in the following table:

Table N° 8: Unrestricted Error Correction Model (ARDL-UECM)

ARDL Cointegrating And Long Run Form				
Dependent Variable: LEXPHH				
Selected Model: ARDL(1, 0, 0, 2, 0, 2)				
CointegratingForm				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEXCH)	0.687220	0.321310	2.138803	0.0473
D(LFD)	1.706739	0.621285	2.747109	0.0138
D(LGIS)	0.323021	0.288855	1.118283	0.2790
D(LGIS(-1))	0.448409	0.223567	2.005699	0.0611
D(LPDI)	0.418006	0.157754	2.649733	0.0168
D(LGDPPC)	-0.676531	0.200224	-3.378872	0.0036
D(LGDPPC(-1))	-0.346079	0.209488	-1.652021	0.1169
CointEq(-1)	-1.353244	0.238027	-5.685243	0.0000
Cointeq = LEXPHH - (0.5078*LEXCH + 1.2612*LFD + 0.1514*LGIS + 0.3089*LPDI -0.2492*LGDPPC + 5.4730)				

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Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXCH	0.507831	0.231975	2.189161	0.0428
LFD	1.261220	0.365757	3.448250	0.0031
LGIS	0.151396	0.248644	0.608888	0.5506
LPDI	0.308892	0.119898	2.576280	0.0196
LGDPPC	-0.249158	0.260160	-0.957710	0.3516
C	5.473013	0.884933	6.184660	0.0000

Source: Prepared by the researcher, based on EViews 12.

From the table above, which presents the Unrestricted Error Correction Model (ARDL-UECM), the error correction term (CointEq(-1)) is statistically significant with the expected negative sign. This provides evidence of a long-run equilibrium relationship among the model variables. The value of the error correction term indicates the speed of adjustment of short-run deviations toward long-run equilibrium, which is 135% (less than a year, making it acceptable). Additionally, the long-run equilibrium equation helps in understanding the nature of the relationships between explanatory variables and the dependent variable as follows:

- **The sign of the real exchange rate coefficient (LEXCH):** It is positive (+0.5) and statistically significant at the 5% level, indicating a direct relationship between the real exchange rate (USD/DZD) and Algeria's non hydrocarbon exports. In other words, there is an inverse relationship between the value of the Algerian dinar and non-hydrocarbon exports. This aligns with economic theory (Robinson's elasticity approach)(Ratoul, 2006, pp. 235-239), suggesting that a 1% increase in the USD exchange rate (i.e., a 1% depreciation of the Algerian dinar) leads to a 0.5% increase in non-hydrocarbon exports. However, this effect remains weak despite being positive,

Despite its positive aspect, this percentage remains low, which can be attributed to local factors related to the limited flexibility of the national productive apparatus—except in recent years—in achieving substantial surplus production outside the hydrocarbons sector with internationally competitive capabilities. In most cases, only self-sufficiency is barely attained. Moreover, there is the potential adverse impact on exports due to the high cost of their production, stemming from the increased costs of importing the raw materials and equipment required for their manufacture, which in turn weakens the competitive advantage derived from the depreciation of the national currency(ELKOUT, RAINOUBA, & CHAOUI, 2023). Additionally, external factors such as income elasticity of demand for imports among Algeria's trading partners, particularly in European countries, play a role. When their incomes rise, they tend to import more raw materials like energy and mining resources rather than food or manufactured goods(Berwain, 2018).

This result is consistent with the findings of Zineb Haimer et al. (2021) and Brouin Sheherazade (2018) but contradicts the findings of Hassan Linda (2020) and Anmar Amin Al-Barwari & Qahtan Diab Salman (2019), which reported an inverse relationship between the exchange rate and the dependent variable.

- **The sign of the financial development coefficient (LFD):** It is positive (+1.3) and statistically significant at the 1% level, indicating a direct relationship between financial development and non-hydrocarbon exports in Algeria. This means that a 1% improvement in the financial development index results in a 1.3% increase in non-hydrocarbon exports, which aligns with economic theory. This can be explained by the positive role of Algeria's financial system in supporting economic activity, especially after a series of reforms and modernization efforts in financial and banking institutions. These improvements have helped meet the needs of economic agents, particularly in lagging sectors like agriculture, industry, and services, by facilitating access to financing and enabling international trade transactions.

This result is consistent with the findings of Nashwa Mostafa Ali Mohamed & Manahil Kamal Al-Din Mohamed Al-Tayeb (2019).

- **The sign of the private investment coefficient (LGIS):** It is positive (+0.3) and statistically significant at the 5% level, indicating a direct relationship between private investment in Algeria and non-hydrocarbon exports. This suggests that a 1% increase in private investment results in a 0.3% increase in non-hydrocarbon exports, which aligns with economic theory. However, despite the positive relationship, the impact remains weak (less than 1). This is because investment in Algeria still faces significant obstacles, including administrative, real estate, logistical, and financial challenges, which hinder the realization of private investment projects. Additionally, many private investors focus solely on the domestic market or, at best, regional markets, rather than international competitiveness. This is due to state-provided protection and the high costs associated with R&D and innovation, which are crucial for global competition (Berwain, 2018).

- **The sign of the public investment expenditure coefficient (LPDI):** It is positive (+0.15) but not statistically significant, indicating that public investment spending does not have a significant impact on Algeria's non-hydrocarbon exports during the study period. This can be attributed to the ineffectiveness of government investment policies in improving the business climate and expanding production capacity. Several factors contribute to this, including: (boufeneche, 2022, p. 383)(SAOUD, 2024, p. 215)

- Escalating costs due to low project execution efficiency, leading to delays and inflated prices over time.
- Repeated re-registration of the same infrastructure projects due to poor planning.
- Inefficient management of completed projects (e.g., airports, ports, industrial zones) caused by bureaucratic hurdles and administrative inefficiencies, which fail to meet investors' expectations.

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- In addition, there is a lack of coordination between investment and trade policies and a lack of direct targeting of constructed infrastructure to serve productive sectors with export potential, which reduces the opportunities for increasing exports outside of hydrocarbons.
- **The sign of the real GDP per capita coefficient (LGDPPC):** It is negative (-0.25) but not statistically significant, indicating that GDP per capita does not have a meaningful relationship with non-hydrocarbon exports in Algeria. This suggests that income growth in Algeria has been largely eroded by rising prices, leading to higher inflation rather than economic expansion. In some cases, increased income has driven up domestic demand, but due to the rigid structure of Algeria’s production system, this has resulted in inflationary pressures rather than increased production, often necessitating higher imports to cover supply shortages.

4.3.4. Statistical and Econometric Model Evaluation:

The model is evaluated by diagnosing residuals and verifying its stability, as follows:

❖ **First – Residual Diagnostics:** To diagnose the model’s residuals, the following tests were conducted:

- **Autocorrelation Test:** Using the Lagrange Multiplier (LM) Test, we assess whether there is serial correlation in the residuals at a lag order greater than 1. The null hypothesis (H0) states that there is no autocorrelation in the residuals, which is rejected if the F-statistic or R-squared statistic (both following a Chi-square distribution) is lower than the critical value or if their probability values are greater than 0.05. The results of this test, as presented in Table 9, indicate no evidence of serial correlation in the residuals.

Table N° 9: Autocorrelation Test Results

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.503698	Prob. F(2,15)	0.6142
Obs*R-squared	1.762129	Prob. Chi-Square(2)	0.4143

Source: Prepared by the researcher, based on EViews 12.

- **Heteroscedasticity Test:** To verify the absence of heteroscedasticity issues, the ARCH(2) test is used. Based on the results in Table 11, we reject the null hypothesis and accept the alternative hypothesis of no heteroscedasticity in the model. This is because the p-values of the Fisher test exceed the 5% significance level. Therefore, we conclude that the estimated parameters are efficient.

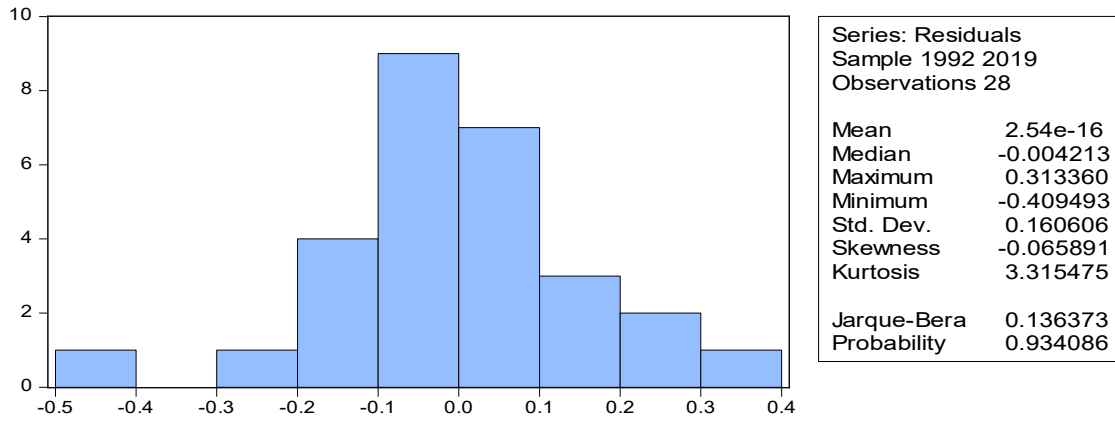
Table N°10: Heteroscedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.005607	Prob. F(10,17)	0.4765
Obs*R-squared	10.40691	Prob. Chi-Square(10)	0.4055
Scaled explained SS	4.441335	Prob. Chi-Square(10)	0.9252

Source: Prepared by the researcher, based on Eviews 12.

- **Residuals Distribution Test:** Using the Bera-Jarque test, it is evident that the residuals follow a normal distribution since the Jaque-Bera probability of 0.93 is greater than the 5% significance level, as shown in Figure 03.

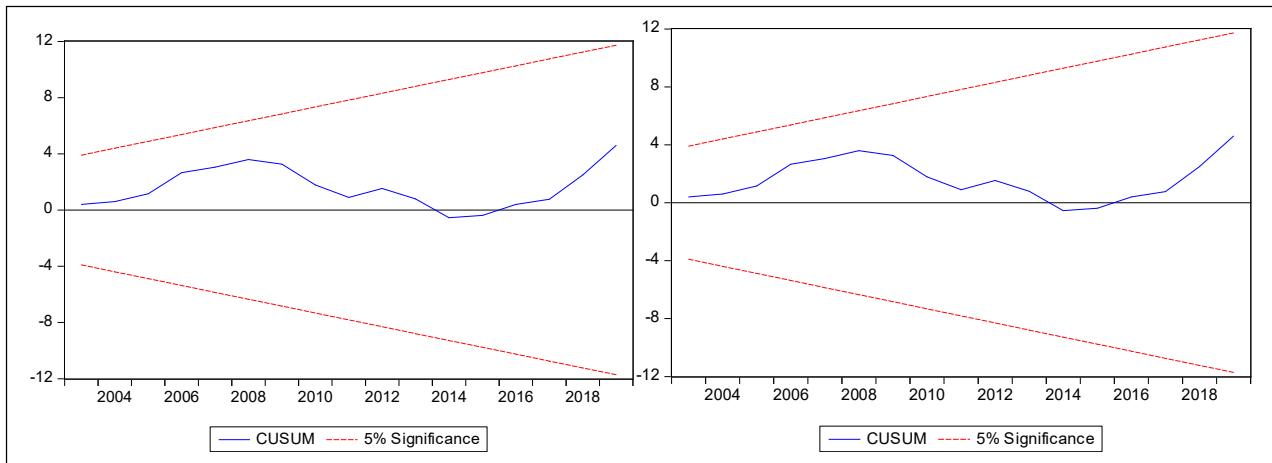
FigN°3: Results of the Normality Test for Residuals



Source: Prepared by the researcher, based on EViews 12

- **Second- Model Stability Test:** To ensure that the data used in this study is free from structural changes, an appropriate test must be applied. Among the most important tests are the Cumulative Sum of Recursive Residuals (CUSUM) and the Cumulative Sum of Squares of Recursive Residuals (CUSUM of Squares). These tests are essential for assessing the stability of the estimated parameters in both the short and long run.

FigN° 4: CUSUM Test for Recursive Residuals FigN°5: CUSUM of Squares Test for Recursive Residuals



Source: Prepared by the researcher, based on EViews 12

Based on Figures (4-5), we observe that the CUSUM test shows a cumulative sum of recursive residuals as a line within the critical bounds, indicating the stability of the model at the 5% significance level. Similarly, the CUSUM of Squares test displays a line within the critical bounds. Therefore, we can conclude that the model demonstrates stability and consistency between the long-term and short-term results.

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5. Conclusion:

Trade exports play a vital role in the Algerian economy, serving as the primary channel for disposing of production surpluses and generating foreign currency. Over the period 1990-2023, export growth rates have experienced several fluctuations, mainly due to variations in hydrocarbon export revenues, which accounted for 89% of total exports in 2023. Meanwhile, the remaining export revenues, stemming from a limited number of productive sectors such as extractive and semi-manufactured industries, as well as primary and processed agricultural products, have remained modest despite recent growth. Their share increased from 4.1% to 9.1% between 1990 and 2023, peaking at 12% in 2021.

This study aimed to identify the key factors influencing the growth of Algeria's non-hydrocarbon exports over the period 1990-2023 by constructing an econometric model based on the Autoregressive Distributed Lag (ARDL) methodology. The empirical results revealed the following:

- ✓ A long-run cointegration relationship exists between Algeria's non-hydrocarbon export value and the explanatory variables included in the study model.
- ✓ The main determinants of non-hydrocarbon export growth in Algeria, according to the proposed model, are the real exchange rate, financial development, and private domestic investment, all of which had a positive impact during the study period. However, the remaining explanatory variables—real GDP per capita and public investment spending—were found to have no significant effect on non-hydrocarbon exports.
- ✓ The speed of adjustment towards equilibrium was 135% per year, meaning that in the event of short-term shocks affecting the explanatory variables, it would take less than one year (approximately nine months) for Algeria's non-hydrocarbon exports to return to their long-run equilibrium.
- ✓ Financial development was identified as the most important determinant of non-hydrocarbon export growth in Algeria, followed by the real exchange rate and private domestic investment.

Based on these findings, we propose the following recommendations to enhance Algeria's non-hydrocarbon export sector:

- Economic diversification is crucial for the development of non-hydrocarbon exports. Algeria must revitalize its productive sectors, particularly those with strong material and human potential, to achieve local production surpluses that can later be exported.
- Improving the investment climate by providing financial and material incentives, such as:
 - Reducing or exempting customs duties on imported raw materials.
 - Tax exemptions for investors.
 - Facilitating access to financing and banking services for both domestic and foreign investors.
 - Supporting investors throughout the investment process, from project inception to exportation.

- Removing obstacles for SMEs, such as difficulties in obtaining industrial land and business licenses.
- Encouraging large-scale investments to benefit from economies of scale, particularly in the agriculture sector. Algeria can leverage foreign expertise by establishing joint ventures outside the hydrocarbon sector. Moreover, enhancing linkages between production sectors (e.g., agriculture and agri-food industries) is essential for balanced sectoral development.
- Focusing on production efficiency by integrating modern technologies and innovative methods, especially with the rise of artificial intelligence, to enhance the competitiveness of Algerian products in international markets.
- Changing the mindset of Algerian producers to shift from a domestic market focus to an international export-oriented approach. This requires familiarity with global market entry requirements, including quality standards and cost competitiveness. The government should implement export promotion strategies through media campaigns and trade exhibitions.
- Easing export-related challenges, particularly those related to logistics, such as packaging, storage, and international transportation.
- Supporting the emerging private sector by overcoming export challenges, particularly those related to the logistical aspects of packaging, storage, and international transportation; and providing the necessary financial and material assistance to enable them to gain a competitive advantage abroad.
- Continuing to develop the financial and banking sector, particularly the role of banking intermediary with international economic operators, by meeting their needs through the provision of advanced, high-quality banking products and services.
- Monetary policy intervention to guide exchange rate policies in a way that encourages international demand for Algerian non-hydrocarbon products while curbing unnecessary imports.
- Enhancing the effectiveness of public investment spending by ensuring that projects are completed on time and meet quality standards, thereby improving the investment climate and attracting capital.
- Activating Algeria's free economic zones, which can serve as export hubs, as seen in successful international experiences. These zones should focus on technology transfer, job creation, and value addition to domestic production.

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