An Econometric Study of the Impact of Household Consumption on Economic Growth in Algeria during the Period 1990–2023

دراسة قياسية لأثر الاستهلاك العائلي على النمو الاقتصادي في الجزائر خلال الفترة 1990–2023

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Abstract:

This research paper aims to study and analyse the impact of household consumption on economic growth in Algeria during the period (1990-2023), using a descriptive analytical approach to diagnose the reality of the study variables, and a standard approach using an autoregressive model for distributed lag periods. The econometric model included real gross domestic product as a dependent variable and household consumption as the main independent variable, with gross fixed capital formation, government spending, and trade openness as control variables. The results of the boundary test showed a long-term equilibrium relationship between the study variables. The estimation results also showed that household consumption has a positive and significant effect on economic growth in the short term, reflecting its role in stimulating aggregate demand in the short term. In contrast, the results revealed no significant effect of household consumption on economic growth in the long term. Furthermore, the Granger causality test indicates a unidirectional causal relationship from economic growth to household consumption.

Keywords: Household Consumption, Economic Growth, co-integration, Granger Causality Test, Algeria.

JEL Classification Codes : E21, O47, C22.

ملخص:

تهدف هذه الورقة البحثية إلى دراسة وتحليل أثر الاستهلاك العائلي على النمو الاقتصادي في الجزائر خلال الفترة (1990–2023)، وذلك باستخدام المنهج الوصفي التحليلي لتشخيص واقع متغيرات الدراسة، والمنهج القياسي باستخدام نموذج الانحدار الذاتي لفترات الإبطاء الموزعة، حيث تضمن النموذج القياسي الناتج المحلي الإجمالي الحقيقي كمتغير تابع والاستهلاك العائلي كمتغير مستقل رئيسي، مع إدراج إجمالي تكوين رأس المال الثابت، الإنفاق الحكومي، والانفتاح التجاري كمتغيرات ضابطة، وأظهرت نتائج اختبار الحدود وجود علاقة توازنية طويلة الأجل بين متغيرات الدراسة، كما بينت نتائج التقدير أن للاستهلاك العائلي أثرا إيجابيا ومعنويا على النمو الاقتصادي في الأجل القصير وهو ما يعكس دوره في تحفيز الطلب الكلي آنيا، وفي المقابل كشفت النتائج عن غياب أي أثر معنوي للاستهلاك العائلي على النمو الاقتصادي في الأجل الطويل، وعلاوة على ذلك يشير تحليل السببية القائم على اختبار غرانجر عن وجود علاقة سببية أحادية الاتجاه تتجه من النمو الاقتصادي نحو الاستهلاك العائلي.

الكلمات المفتاحية: الاستهلاك العائلي، النمو الاقتصادي، التكامل المشترك، اختبار غرانجر للسببية، الجزائر.

تصنيف JEL: E21، O47، C22.

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INTRODUCTION:

The subject of economic growth and its stimulating factors occupies an important position in economic literature and development policies, as countries strive to identify the genuine drivers that ensure the sustainability and stability of economic expansion. In this context, household consumption is considered one of the most fundamental components of aggregate demand, often accounting for the largest share of Gross Domestic Product (GDP), frequently exceeding the 60% threshold in most developed and developing countries.

Therefore, studying the relationship between consumption and growth acquires increasing importance in light of the structural transformations witnessed by the global economy. While traditional Keynesian economic theory emphasizes the role of consumption demand as a locomotive for growth through the multiplier mechanism that stimulates investment and employment, other propositions emerge that question the inevitability of this relationship, especially in developing economies. In these economies, the expansion of consumption may not necessarily lead to stimulating domestic production; rather, a portion of it may turn into a channel for national income leakage towards imports, leading to the exacerbation of the trade deficit without creating real value added.

In Algeria, this subject takes on a particular specificity. The Algerian economy, characterized by its rentier nature and primary dependence on the hydrocarbon sector, faces a chronic challenge represented by the weak elasticity of the productive apparatus outside hydrocarbons. Despite government subsidy programmes and recurrent wage increases aimed at raising the purchasing power of households over the past three decades, the question remains regarding the effectiveness of household consumption expenditure in moving the wheel of real production, and the extent of Algerian households' consumption contribution to wealth creation.

From this premise, this study comes to shed light on the nature of the relationship between household consumption and economic growth in Algeria during the time period extending from the year 1990 until the year 2023. This period includes phases in which Algeria went through periods of instability, financial abundance, and modern external shocks, doing so by using modern econometric tools to transcend the descriptive proposition and determine the direction of causality with precision.

1.1. Research Problem:

In the context of understanding the nature of the relationship connecting household consumption to economic growth in Algeria, the problem of this study can be formulated in the following main question:

- What is the impact of household consumption expenditure on economic growth in Algeria during the period (1990–2023)?

Derived from this main question is a set of sub-questions represented as follows:

- Is there an equilibrium relationship (cointegration) between household consumption and economic growth in Algeria?
- What is the impact of household consumption on economic growth in Algeria in the short and long runs?
- What is the direction of the causal relationship between household consumption and economic growth in Algeria?

1.2. Research Hypotheses:

- The Algerian economy during the period (1990–2023) is characterised by consumption-led growth, such that household consumption expenditure constitutes a driving factor for economic growth.

- There exists a stable, long-run equilibrium relationship between household consumption expenditure and economic growth in Algeria during the studied period.
- Household consumption exerts a positive and significant impact on the Gross Domestic Product (GDP) in both the long and short runs.
- There exists a unidirectional causal relationship running from household consumption towards economic growth in Algeria, in line with the Keynesian consumption multiplier theory.

1.3. Research Objectives:

This study aims to analyse the nature of the relationship between household consumption expenditure and economic growth in Algeria during the period (1990–2023), by testing for the existence of a long-run equilibrium relationship between the two variables using the Autoregressive Distributed Lag (ARDL) methodology. The study also seeks to measure the magnitude and direction of the impact of household consumption on the Gross Domestic Product (GDP), with the aim of determining its relative weight in stimulating economic growth. Furthermore, the study intends to reveal the direction of causality between the two variables to determine whether household consumption represents a driver of growth or is merely a reflection of improved income levels, which is essential for formulating effective economic policies within the context of the Algerian economy.

1.4. Significance of the Research:

The significance of this study lies in the following:

- Enriching the theoretical literature by testing the validity of the consumption-led growth hypothesis within the context of the Algerian economy and discussing the limits of Keynesian theory in light of the phenomenon of consumption leakage through the import channel.
- Providing an empirical contribution through a rigorous econometric analysis of the relationship between household consumption and growth in Algeria for the period (1990–2023) using the ARDL methodology, which goes beyond simple correlation analyses, with a focus on precisely determining the direction of causality.
- Guiding economic policies for decision-makers by providing scientific evidence on the feasibility of policies stimulating consumption demand, and directing attention towards the necessity of strengthening the domestic productive apparatus as a prerequisite for the optimal utilisation of Algerian households' consumption as a driver for sustainable growth.

1.5.Literature Review:

The relationship between household consumption and economic growth has received extensive attention in economic literature; however, empirical results have remained divergent and subject to the specificity of the economic structure of each country. By reviewing the most significant recent studies, research trends in this field can be classified into two main streams:

- **The First Stream: Household Consumption as a Main Driver of Economic Growth:**

This stream represents the prevailing view in the literature, aligning with the Keynesian theory which regards aggregate demand (with consumption being its main component) as the locomotive for growth. The majority of empirical studies have confirmed the existence of a positive and strong impact of consumption on growth, particularly in emerging and Asian economies.

In the context of oil-based economies similar to the Algerian economy, studies by (Khoj & Balila, 2022) and (Al Rasasi & others, 2021) concluded that household consumption in Saudi Arabia has a significant positive and stimulating impact on economic growth, with the existence of a unidirectional causal relationship running from household consumption towards economic

growth. Not far from the Saudi economy, a previous study by (Alrefo and others, 2016) demonstrated the existence of a very strong and statistically significant positive impact of household consumption on the Gross Domestic Product in Jordan.

As for China, which is considered a model for economies that have shifted to relying on domestic demand as a driver to stimulate economic growth, several studies have provided decisive evidence on the strength of the impact of household consumption on its economic growth. A study by (YU & FANG, 2015) showed that the consumption of urban residents, in particular, has a capacity exceeding unity (1.02) in stimulating economic growth. Furthermore, studies by (Laiguoguo , 2024) and (Pettis, 2024)) supported this trend, emphasising the necessity of stimulating consumption demand to achieve sustainable growth, arguing that household consumption not only stimulates demand but also drives companies to increase investment and production, thereby creating a virtuous economic cycle.

In Indonesia, studies by (Rafiy & others, 2018) and (Syafri & others, 2018), using ARDL models and panel data, found a positive and significant impact of household consumption expenditure on growth in both the short and long runs. This result was reinforced by the study of (Supriaman & Abd Mubaraq, 2024), which found that consumption explains a large part of output fluctuations in West Kalimantan province in Indonesia. Additionally, the study by (Luciany & others, 2024) concluded that household consumption impacts economic growth positively and with statistical significance, and that the interaction between the role of investment and household consumption strengthens the impact of the latter.

In other contexts, a study by (Fatima & others, 2024) in Pakistan found that household consumption has a positive and significant impact on economic growth, contrary to government consumption expenditure which had a negative impact. In the economies of poor (fragile) states, the role of household consumption emerges even more prominently, as in the study by (Abdullahi , 2019), which found a very strong positive correlation (0.92) between household expenditure and economic growth in Puntland, Somalia, making it a fundamental driver in the absence of strong investment channels.

- **The Second Stream: Weak (Insignificant) Impact of Household Consumption on Economic Growth:**

In contrast to the aforementioned stream, studies within this trend present a view divergent from the results of the former. This perspective posits that the impact of household consumption on economic growth may be weak, insignificant, or even negative in certain economic contexts. The theoretical argument for this stream is based on the premise that an increase in household consumption, especially if it occurs at the expense of savings directed towards investment or if it is channelled towards the consumption of imported products, does not translate into real growth in domestic production.

The study by (Ferdiansah, 2022) on the Indonesian economy serves as a rare and clear example of this trend. In its partial analysis, it found that household consumption had a statistically significant negative impact on economic growth, whereas investment in the same study model had a strong and significant positive impact on economic growth. This result was supported by the study of (Aisyah Nst & others, 2024), which concluded that there was no significant impact of household consumption, government expenditure, or exports on economic growth in the province of North Sumatra, Indonesia. This result was interpreted by the fact that

other factors not included in the study model have a larger and more important influence on growth in this province.

Furthermore, the study by (Rumbia & others, 2020)offers significant additional evidence on the economies of four Asian countries (Indonesia, Singapore, Thailand, and the Philippines), clearly distinguishing between temporal effects. While it found a positive impact of household consumption on economic growth in the short run, it concluded that there was no significant impact on economic growth in the long run. This indicates that household consumption may play a role in managing short-term fluctuations but is not considered a fundamental factor for sustainable growth in light of the dominance of other external variables such as crude oil prices.

Generally, the results of studies in this stream may also support research focusing on the leakage of consumption demand abroad via imports in economies with a limited productive base. Although most studies did not find a direct negative impact, their logic opens the door to the possibility of a weak or ineffective impact, where an increase in demand does not stimulate local investors and producers as much as it stimulates foreign producers. Through this divergence in the literature, it becomes clearly evident that the nature of the relationship between household consumption and economic growth is not absolutely positive and inevitable; rather, it is the product of the country's productive structure, the elasticity of its economic apparatus, and the nature of its trade policy. This is precisely what our current study seeks to test within the context of the Algerian economy.

2. Theoretical Development of the Analysis of the Relationship between Household Consumption and Economic Growth:

The relationship between household consumption and economic growth represents a controversial and significant theoretical issue that has witnessed complex developments throughout the course of modern economic thought. Theoretical assessments of the role of consumption have varied according to the economic school; while some streams viewed high consumption as inhibiting savings and investment, others considered it a fundamental driver of effective demand and, consequently, of economic growth.

Classical theory asserts that excessive consumption restricts savings and capital accumulation, thereby hindering long-term growth. It focused on the balance between savings and investment as the primary engine of growth, rather than consumption itself (Boulding, 1945, p. 01). In contrast, Keynesian theory presented a direct analysis attributing growth to the role of consumption in stimulating effective demand (Gualerzi, 2012, p. 01), which encourages production expansion and raises employment rates and national income through the economic multiplier mechanism.

Low-level equilibrium trap theories transcended this debate by focusing on how insufficient consumption and investment lock the economy into a cycle of low productivity, necessitating a dynamic balance between current consumption and future developmental potential (Steger, 2000, p. 01). Furthermore, neoclassical theories, led by Solow and Koopmans, contributed to clarifying the impact of savings rates on capital accumulation and growth, explaining that high savings facilitate investment in productive sectors, whereas high consumption leads to limited investment opportunities (Steger, 2000, p. 01).

Endogenous growth models in the late twentieth century brought about a fundamental shift in theoretical thought by incorporating human capital and innovation as determinants of growth. From this perspective, household consumption directed towards education and skills development can improve workforce productivity, thereby enhancing sustainable economic growth.

Moreover, the Pasinetti model offered a distinct analytical path linking structural change in the economy to the evolution of household consumption patterns. He explained that shifts in consumption patterns establish new markets and promising investment opportunities, reflecting the pivotal and effective role of consumption in market expansion. Based on this analysis, Pasinetti stipulates that any impact of consumption expenditure on growth must be coupled with a substantial evolution in consumption patterns and investment in new products, indicating a close interconnection between the investment structure and the structural transformation of the economy (Gualerzi, 2012, pp. 36-37-38).

In light of Pasinetti's aforementioned contributions linking consumption patterns and structural transformation, the specificity of developing rentier economies acquires particular importance. The absence of structural transformation in the productive structure limits the possibility of converting consumption demand into a sustainable expansion of productive capacity. This means that the broadening of the household consumption base under the influence of oil revenues and government transfers renders a significant portion of this consumption directed towards final consumer goods and consumption imports that are not accompanied by parallel investments in productive industrial and service sectors. This relative disconnection between the interaction of consumption demand and the slowness of structural transformation explains the weak ability of household consumption to generate long-term growth paths, contrary to what Pasinetti's analyses assume in more diversified and innovative economic contexts.

In conclusion, it can be stated that the gradual evolution of theoretical thought on the relationship of household consumption (as a component of aggregate consumption) with economic growth indicates a trajectory of transition from low-level trap models to complex analytical frameworks that integrate consumption, savings, and human capital, reflecting the composite interactions in driving economic growth. Contemporary economics supports the role of household consumption as an effective lever for growth, provided it is directed towards stimulating domestic production and ensuring an institutional and developmental framework that enhances the effectiveness of macroeconomic policies.

3. Trends in the Evolution of Household Consumption and Economic Growth in Algeria during the Period 1990–2023:

Analysing the historical trajectory of both household consumption and Gross Domestic Product (GDP) is of paramount importance for understanding the nature of the relationship between them. A reading of the data in Table (01) below and the accompanying graph allows for tracking the quantitative and structural developments of these two indicators, and revealing their interaction across the various major economic and political milestones that Algeria has experienced, starting from the phase of structural imbalances in the 1990s, passing through the period of financial recovery, and reaching the phase of modern external shocks.

Table (01): Real Evolution of Household Consumption and Gross Domestic Product in Algeria during the Period 1990–2023

Unit: billion dinars

Year	GDP at Constant Prices	Household Consumption at Constant Prices	Ratio of Household Consumption to GDP (%)	Year	GDP at Constant Prices	Household Consumption at Constant Prices	Ratio of Household Consumption to GDP (%)
1990	3 711,15	1 851,25	49,88%	**2007**	6 017,38	2 538,74	42,19%
1991	3 666,62	1 714,84	46,77%	**2008**	6 167,81	2 696,14	43,71%
1992	3 732,62	1 797,47	48,16%	**2009**	6 241,83	2 882,18	46,18%
1993	3 654,23	1 752,06	47,95%	**2010**	6 541,43	3 043,58	46,53%
1994	3 621,35	1 742,16	48,11%	**2011**	6 737,68	3 207,93	47,61%
1995	3 758,96	1 778,31	47,31%	**2012**	6 899,38	3 435,70	49,80%
1996	3 913,07	1 735,58	44,35%	**2013**	7 078,77	3 645,27	51,50%
1997	3 956,12	1 698,13	42,92%	**2014**	7 369,00	3 842,12	52,14%
1998	4 157,88	1 733,73	41,70%	**2015**	7 604,80	3 991,96	52,49%
1999	4 290,93	1 784,91	41,60%	**2016**	7 901,39	4 099,75	51,89%
2000	4 453,99	1 871,71	42,02%	**2017**	8 019,91	4 194,04	52,30%
2001	4 587,61	1 916,63	41,78%	**2018**	8 132,19	4 303,08	52,91%
2002	4 835,34	1 999,05	41,34%	**2019**	8 205,38	4 414,96	53,81%
2003	5 149,63	2 091,00	40,60%	**2020**	7 795,11	4 203,05	53,92%
2004	5 381,37	2 214,37	41,15%	**2021**	8 091,33	4 270,30	52,78%
2005	5 671,96	2 316,23	40,84%	**2022**	8 382,61	4 424,03	52,78%
2006	5 836,45	2 397,30	41,07%	**2023**	8 726,30	4 605,41	52,78%

Source: Prepared by the researchers based on (World Bank Database, 2025)**.**

Based on the time series figures in Table (01), we can observe the nature of the complex relationship that governed the trajectory of both household consumption and economic growth in Algeria during the study period, which reflects the magnitude of the deep transformations in the structure of the Algerian economy. This trajectory can be disaggregated into three distinct time epochs as detailed below:

- **The Contraction Period (1990–1999):**

This epoch was characterised by stagnation in macroeconomic performance, as Real Gross Domestic Product (RGDP) remained hovering around semi-constant levels (minimal average annual growth), rising slowly from 3.711,15 billion DZD in 1990 to 4.290,93 billion DZD in 1999, This stagnation cast a shadow over the consumption expenditure of Algerian

households, which was characterised by fluctuation and instability, recording real declines during the periods of the security crisis the country underwent. This consumption retrenchment is mainly attributed to the erosion of purchasing power due to inflationary pressures and the implementation of strict austerity policies within the Structural Adjustment Programme with international financial institutions. This was clearly manifested in the continuous decline of the ratio of household consumption to GDP from 49,88% at the beginning of the decade to settle at its historic low of 41,60% at its end, indicating a decline in households' share of national income in favour of servicing external debt burdens.

- **The Consumption Expansion Period (2000–2013):**

The year 2000 constituted a decisive turning point for the trajectory of Algerian household consumption evolution. This phase was distinguished by the accelerated and concurrent growth of both variables under the influence of improved terms of trade and revenues. This period witnessed an approximate doubling of the volume of GDP, which jumped from 4.453,99 billion DZD in the year 2000 to reach 7.078,77 billion DZD by the year 2013.

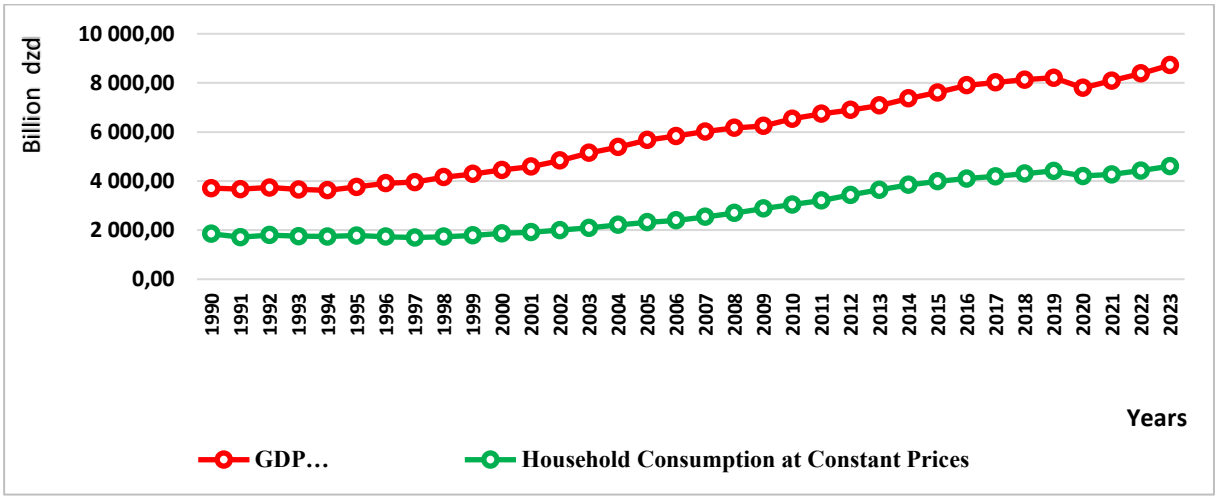
In parallel, household consumption recorded qualitative leaps, exceeding the threshold of 3.600 billion DZD at the end of this period. The most significant aspect of this phase is the structural shift in the weight of household consumption, which resumed its rise to claim an increasing share of output, reaching 51,50% in 2013. We can interpret this consumption momentum of Algerian households by the implementation of economic recovery programmes and policies for wage improvement and social support, which enabled the decoupling from previous liquidity constraints, transforming household consumption into a main engine of aggregate demand.

- **The Period of Divergence in Variable Growth (2014–2023):**

This period was distinguished by the emergence of a striking economic paradox represented by the resilience of household consumption volume in the face of external shocks. While GDP growth witnessed structural deceleration and circumstantial contraction during the COVID-19 pandemic, declining from 8.205,38 billion DZD to 7.795,11 billion DZD in 2020, household consumption maintained its upward trend, recording record levels reaching 4.605,41 billion DZD in 2023. This trajectory was embodied in the stabilisation of the ratio of household consumption to GDP at high and unprecedented levels ranging between 52% and 53%. This phenomenon is attributed to the effectiveness of social support mechanisms and the series of increases in the wage bill during the years 2022 and 2023, which helped Algerian households preserve their acquired living standards despite the decline in the pace of economic growth.

To highlight the fundamental results and trends revealed by the data in Table (01), we will review the following Figure (01), which visually and precisely illustrates the evolution of household consumption and economic growth (Gross Domestic Product) values, allowing for a deeper understanding of the changes that have occurred in them.

Fig (01): Real Evolution of Household Consumption and Gross Domestic Product in Algeria during the Period 1990–2023



Source: Prepared by the researchers based on data from Table (01)

4. Econometric Study:

In this part of the study, we will attempt to construct an econometric model to determine the impact exerted by household consumption on Gross Domestic Product growth (economic growth) in Algeria. Therefore, we will attempt to investigate the most important factors influencing GDP growth using annual data for the period 1990–2023.

4.1. Study Variables:

In order to measure the impact of household consumption on economic growth in Algeria during the period (1990–2023), a set of macroeconomic variables derived from World Bank data and indicators was relied upon, as follows:

- **Dependent Variable**: Represented by Real Gross Domestic Product, denoted as RGDP, which measures the level of aggregate economic activity after excluding the effect of inflation.
- **Independent Variables**: Represented by:

- Real Household Consumption Expenditure: Denoted as **HCE**, representing the main component of aggregate demand linked to household consumption behaviour.
- Gross Fixed Capital Formation: Denoted as **GFCF**, embodying the volume of real investment in the economy, reflecting future productive capacities.
- Government Consumption Expenditure: Denoted as **GOV**, expressing the direct role of the public sector in stimulating aggregate demand and providing public services.
- Degree of Trade Openness: Denoted as **OPEN**, representing the ratio of foreign trade to Gross Domestic Product, allowing for capturing the impact of the national economy's integration with international trade.

It should be noted that the study model was formulated in the logarithmic form for the real variables to reduce the variance of the time series and obtain direct estimates of elasticities, while retaining the trade openness variable in its ratio form. Accordingly, the Autoregressive Distributed Lag (ARDL) model took the following form:

$$\ln(RGDP_t)=\beta_0+\beta_1\ln(HCE_t)+\beta_2\ln(GFCF_t)+\beta_3\ln(LGOV_t)+\beta_4 OPEN_t+\varepsilon t$$

4.2. Results Analysis and Discussion:

The methodological foundation for estimating the Autoregressive Distributed Lag (ARDL) model requires subjecting the time series of the studied variables to a bundle of necessary preliminary econometric tests. These diagnostic procedures aim substantially to verify the stationarity properties and determine the order of integration for each series, ensuring the absence of second-order integration I (2), which could invalidate the model's applicability. Furthermore, these tests constitute a necessary preamble to detecting the existence of a stable long-run equilibrium relationship between the variables, thereby lending statistical reliability and economic credibility to the subsequent estimation results.

4.2.1. Time Series Stationarity Test:

Examining the stationarity properties of time series is a primary and decisive step before commencing the estimation of the relationship between variables, to ensure they are free from spurious regression problems and to determine the appropriate order of integration for applying the ARDL methodology. This methodology stipulates that variables must be integrated of order zero **I (0)** or order one **I (1)**, and that none of them be integrated of order two **I (2)**. To verify this, the study relied on the Augmented Dickey-Fuller (ADF) test, which tests the null hypothesis stating the presence of a unit root (non-stationarity) against the alternative hypothesis stating the stationarity of the series (Abdelkader Attieh, 2004, p. 657). A significance level of 5% was adopted as the threshold for making the statistical decision. The results of the table below summarise the outputs of this test for all study variables.

Table (02): Summary of Augmented Dickey-Fuller (ADF) Test Results

Study Variables	Level		1st Difference		Order of Integration
	t-Statistic	Prob	t-Statistic	Prob	
LRGDP	-1.622	0.7622	-4.188	0.0122	I (1)
LHCE	-1.629	0.7585	-4.597	0.0046	I (1)
LGFCF	-2.067	0.5413	-3.904	0.0235	I (1)
LGOV	-1.633	0.7567	-4.534	0.0053	I (1)
OPEN	-0.730	0.9615	-6.598	0.0000	I (1)

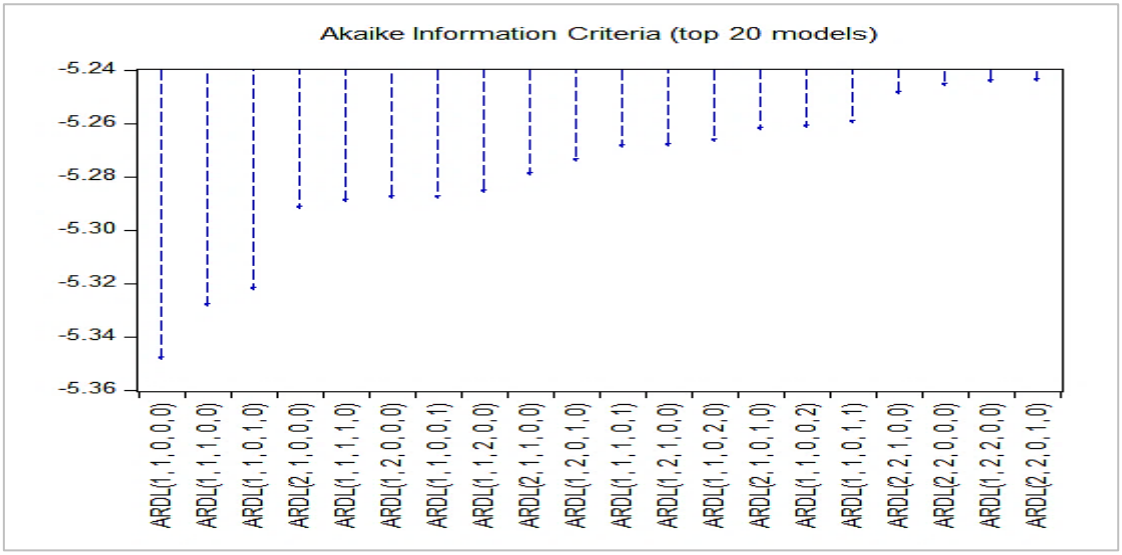
Source: Prepared by the researchers based on EViews 10 outputs.

It is evident from the analytical reading of the Augmented Dickey-Fuller (ADF) test results listed in the table above that all variables adopted in the model did not satisfy the stationarity condition at the level. The probability values (P-values) were greater than the statistically acceptable significance limits (5%) in the model specification containing an intercept and a trend. Conversely, tests at the first differences showed complete stationarity for all-time series, as the statistical values were lower than the critical values at high significance levels (1% and 5%). This compels us to reject the null hypothesis stating the presence of a unit root and accept the alternative hypothesis confirming the stationarity of the series. Based on this result, which proves that all study variables are integrated of the first order I (1), it is confirmed that the necessary econometric conditions for applying the Autoregressive Distributed Lag (ARDL) methodology to estimate the model parameters are met.

4.2.2. Results of the Optimal Lag Selection Test:

Determining the optimal lag length is a step of utmost importance to ensure the quality of estimation and avoid problems of serial correlation (autocorrelation) among residuals and the loss of degrees of freedom. For this purpose, we relied in our econometric study on the Akaike Information Criterion (AIC) to evaluate the best possible models. This criterion allows for differentiating between models and selecting the one that achieves the lowest value for the criterion, reflecting the optimal balance between model accuracy and complexity. The results of this test for the best 20 proposed models are illustrated in the following figure:

Fig (02): Results of Optimal Lag Length Test



Source: Prepared by the researchers based on EViews 10 outputs.

Based on the graphical results illustrated in Figure (02) and the selection criterion (AIC), the optimal econometric model automatically selected from among 162 evaluated models is the model with the specification ARDL (1, 1, 0, 0, 0). Mathematically and economically, this specification indicates that the mechanism of Real Gross Domestic Product (LRGDP) growth is influenced by its value in the previous period (one lag). It is also influenced by the household consumption variable (LHCE) in the current period and one previous period, whereas the remaining independent variables, represented by gross fixed capital formation (LGFCF), government expenditure (LGOV), and trade openness (OPEN), enter the model with their instantaneous impact only (without lags).

Accordingly, the equation of the estimated model in its general form (Unrestricted Error Correction Model) takes the following shape:

$$\Delta LRGDP_t = \alpha_0 + \alpha_1 \sum_{i=0}^{1} \Delta LHCE_{t-1} + \beta_1 \Delta LRGDP_{t-1} + \beta_2 \Delta LHCE_{t-1} + \beta_3 \Delta LGFCF_{t-1} + \beta_4 \Delta LGOV_{t-1} + \beta_5 \Delta OPEN_{t-1} + \lambda ECT_{t-1} + \varepsilon t$$

This structure reflects the immediate response of economic growth to changes in investment, government expenditure, and trade openness, whereas the impact of household consumption extends to include past time, which may reflect the nature of consumption behaviour characterised by persistence and habit formation.

4.2.3. Cointegration Test:

The bounds test is conducted to examine the long-run relationship between variables using the F-test. Since the critical values do not follow standard distributions, they are compared with the critical values provided by Pesaran et al. (2001). This methodology does not require variables to be integrated of the same order; rather, it can be applied to variables of different orders. The null hypothesis (H_0), stating the absence of a long-run relationship between the study variables, is tested against the alternative hypothesis (H_1), stating the existence of a long-run relationship, as follows:

$$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$$

$$H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$$

Table (03): Bounds Test Results for Cointegration

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	4.239755	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Source: Prepared by the researchers based on EViews 10 outputs.

The results illustrated in the table above indicate that the calculated F-statistic value reached (4.239), which exceeds the upper bound of the critical values at the 5% significance level, which is (3.49). Based on this result, we reject the null hypothesis (H_0) stating the absence of cointegration and accept the alternative hypothesis (H_1) confirming the existence of a long-run equilibrium relationship between the study variables. This means that the independent variables (household consumption, investment, government expenditure, trade openness) move together with the Gross Domestic Product along a common path in the long run.

4.2.4. Estimation of the Long-Run Relationship:

After confirming the existence of a long-run cointegrating relationship between the study variables, the coefficients of the long-run relationship can be estimated, as illustrated in Table (04):

Table (04): Estimation Results of Long-Run Coefficients

Levels Equation Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LHCE	-0.893713	0.925988	-0.965145	0.3434
LGFCF	0.178525	0.425827	0.419244	0.6785
LGOV	1.466288	0.720834	2.034154	0.0523
OPEN	3.61E-05	4.26E-05	0.846608	0.4049
C	13.44537	8.034637	1.673426	0.1062
EC = LRGDP - (-0.8937*LHCE + 0.1785*LGFCF + 1.4663*LGOV + 0.0000 *OPEN + 13.4454)				

Source: Prepared by the researchers based on EViews 10 outputs.

Evaluation of the Long-Run Model: Through Table (04), we observe the following:

- An insignificant relationship between Gross Domestic Product (RGDP) and Household Consumption (HCE) in the long run: This is confirmed by the probability value estimated at 0.3434, which is significantly larger than the 5% significance level. This implies that changes

in household consumption do not exert a statistically significant influence on economic growth in the long run within the current model. The absence of a significant impact (and possibly the negative sign) may be attributed to the consumption structure in Algeria, which relies heavily on imported final goods. This suggests that an increase in consumption may lead to income leakage abroad (via imports) rather than stimulating the domestic productive apparatus. Additionally, there is the possibility of strong collinearity between government expenditure (salaries and transfers) and household consumption.

- An insignificant relationship between Gross Domestic Product (RGDP) and Gross Fixed Capital Formation (GFCF) in the long run: This is evident from the high probability value (0.6785), which exceeds the 5% threshold. This means that a 1% increase in physical investment did not demonstrate a real and certain impact on growth during the study period. We can interpret this result through the problem of the weak marginal efficiency of investment in the Algerian economy, where investment projects may suffer from long implementation periods or weak productive yield, preventing these capital accumulations from transforming into tangible and sustainable real growth in the long run.
- A positive and significant relationship between Gross Domestic Product (RGDP) and Government Expenditure (GOV) in the long run: This is confirmed by the probability value estimated at 0.0523 (which is an acceptable value significantly at the 10% level and very close to 5%). The estimated coefficient of 1.46 indicates that a 1% increase in government expenditure leads to an increase in Gross Domestic Product by an estimated 1.46% (assuming other factors remain constant). This result reflects the pivotal role of the state in the Algerian economy, where public expenditure is considered the primary engine of aggregate demand and the wheel of development, in line with the Keynesian proposition, especially in light of the Algerian economy's dependence on oil revenues to finance public projects and infrastructure.
- An insignificant relationship between Gross Domestic Product (RGDP) and Trade Openness (OPEN) in the long run: The probability value reached 0.4049 (greater than 5%), which negates the existence of a statistical impact of trade openness on growth. This reflects the weak actual integration of the Algerian economy into global value chains outside the hydrocarbon sector, where openness is often limited to exporting raw materials and importing consumer goods. This pattern does not contribute effectively to technology transfer or stimulating local productive growth as assumed by international trade theories.

4.2.5. Estimation of the Short-Run Relationship within the Error Correction Model (ECM) Framework:

The penultimate step in estimating the ARDL model consists of determining the short-run relationship coefficients and estimating the Error Correction Model (ECM), which measures the speed of adjustment of short-run disequilibria towards long-run equilibrium.

Table (05): Estimation Results of the Short-Run Relationship and the Error Correction Model

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LHCE)	0.214187	0.098351	2.177789	0.0387
CointEq(-1)*	-0.144046	0.026155	-5.507318	0.0000

R-squared	0.590913	Mean dependent var	0.025909
Adjusted R-squared	0.577716	S.D. dependent var	0.023310
S.E. of regression	0.015148	Akaike info criterion	-5.483267
Sum squared resid	0.007113	Schwarz criterion	-5.392569
Log likelihood	92.47390	Hannan-Quinn criter.	-5.452750
Durbin-Watson stat	1.619637		

* p-value incompatible with t-Bounds distribution.

Source: Prepared by the researchers based on EViews 10 outputs.

The data in the table above indicate the estimation results of the impact of the studied macroeconomic variables on economic growth in the short run. We observe that the value of the error correction term (CointEq (-1)) is negative and significant at a probability level much lower than 1% (0.0000), with a value equal to -0.144046.

This result can be interpreted as follows: the dependent variable, represented by Gross Domestic Product (RGDP), requires a time period estimated at (1/0.144046 ≈6.94), or approximately 7 years, to correct the disequilibrium occurring in the short run and return to the equilibrium level in the long run. This means that the deviation of RGDP from its equilibrium value in period (t-1) will be corrected by a rate of approximately 14.40% in period (t). This is a relatively slow adjustment speed that reflects the Algerian economic structure.

Furthermore, the obtained value for the Coefficient of Determination (R^2) is 0.5909, This indicates that the explanatory variables in the difference form (short run) explain approximately 59% of the instantaneous changes occurring in the economic growth rate. The remaining percentage is explained by other factors not included in the model and contained within the random error term. This result is confirmed by the value of the Adjusted Coefficient of Determination ($\overline{R^2}$), which amounts to 0.5777, In addition the regression of our study model possesses acceptable statistical quality and is not spurious. This is proven by the Durbin-Watson statistic, which reached a value of 1.619. This value is close to 2, indicating that the model is initially free from the problem of serial correlation of errors, and it is clearly greater than the value of the coefficient of determination ($DW > R^2$).

4.2.6. Model Validity Test:

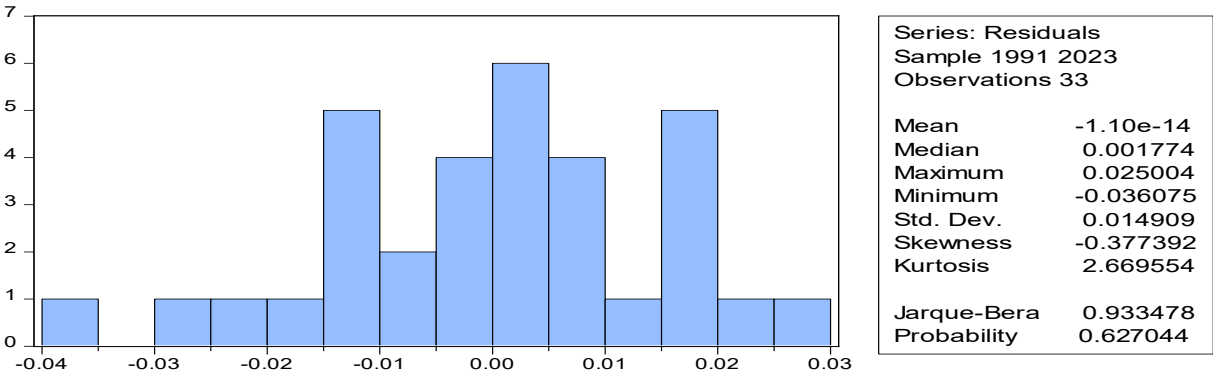
In order to ensure the quality of our estimated model and its suitability for forecasting and analysis purposes, and to ensure it is free from econometric problems that might affect the credibility of the results, we conducted a set of diagnostic tests on the residuals and parameter stability, which are as follows:

A. Normality Test of the Residual Series:

In order to demonstrate that the model residuals follow a normal distribution, we rely on the Jarque-Bera test, and the results shown in Figure (03) below indicate that the test statistic reached 0.933478 with a probability value estimated at 0.627044, which is a value that clearly exceeds the significance level set at 0.05, and based on this result, we state that there is insufficient evidence to reject the null hypothesis, which leads us to accept that the model

residuals are normally distributed at a 95% confidence level, which reinforces the validity and accuracy of the statistical tests used in estimating the model parameters.

Fig (03): Normality Test of the Residual Series



Source: Prepared by the researchers based on EViews 10 outputs.

B. Residual Serial Correlation Test (Breusch-Godfrey Serial Correlation LM Test):

This test aims to detect whether the model residuals are correlated with each other over time (serial correlation), as the existence of this correlation leads to the inefficiency of the estimators and the bias of the standard deviations, and the null hypothesis (H^0) of this test states the absence of serial correlation among the residuals.

And it becomes clear to us through Table (06) which includes the results of the LM test, that the probability value (Prob. Chi-Square) reached 0.5679, which is a value greater than the 5% significance level, and therefore we accept the null hypothesis and reject the alternative hypothesis, which means that the study model is free from the problem of serial correlation of errors, which confirms the efficiency of the estimated model.

Table (06): Results of the Residual Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.426104	Prob. F(2,24)	0.6579
Obs*R-squared	1.131603	Prob. Chi-Square(2)	0.5679

Source: Prepared by the researchers based on EViews 10 outputs.

C. Heteroskedasticity Test (Breusch-Pagan-Godfrey):

To verify the hypothesis of the stability of the variance of the random error terms (Homoskedasticity),which is considered a fundamental condition for the validity of the inferences of the Ordinary Least Squares method and to avoid bias in estimating standard deviations, we will use the Breusch-Pagan-Godfrey test, and the results shown in Table (07) indicate that the statistic value (Obs*R-squared) reached 7.68, and by comparing that with the probability value (Prob. Chi-Square) which recorded 0.2624, it becomes clearly evident to us that it clearly exceeds the significance level adopted in the study (5%), and based on this result, we can state that there is no sufficient statistical evidence to reject the null hypothesis (H_0) stating homoskedasticity, and therefore we conclude that the residuals of the estimated model possess a constant and stable variance, which enhances the reliability of the results and the model estimators.

Table (07): Results of the Residual Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.314571	Prob. F(6,26)	0.2859
Obs*R-squared	7.680872	Prob. Chi-Square(6)	0.2624
Scaled explained SS	3.980153	Prob. Chi-Square(6)	0.6794

Source: Prepared by the researchers based on EViews 10 outputs.

D. Model Structure Stability Test:

In order to ensure the study model is free from any fundamental structural changes during the estimation period, we will rely on structural stability tests, where this includes both the Cumulative Sum of Recursive Residuals (CUSUM) test and the Cumulative Sum of Squares of Recursive Residuals (CUSUM of Squares) test, and these two tests acquire extreme importance in econometric studies as the (CUSUM) test focuses primarily on detecting systematic instability in the estimated parameters and the extent of their consistency between the short and long terms, while the (CUSUM of Squares) test specializes in monitoring the stability of error variance and detecting any sudden deviations or structural shocks in the data, and the condition of structural stability for the estimated parameters is fulfilled in both tests if the path of the statistic's graph falls entirely within the critical bounds (the critical region) at a 5% significance level.

Fig (04): Results of (CUSUM) Test

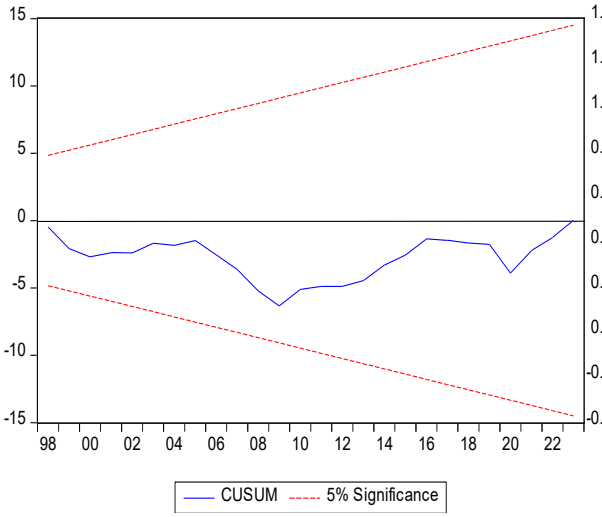
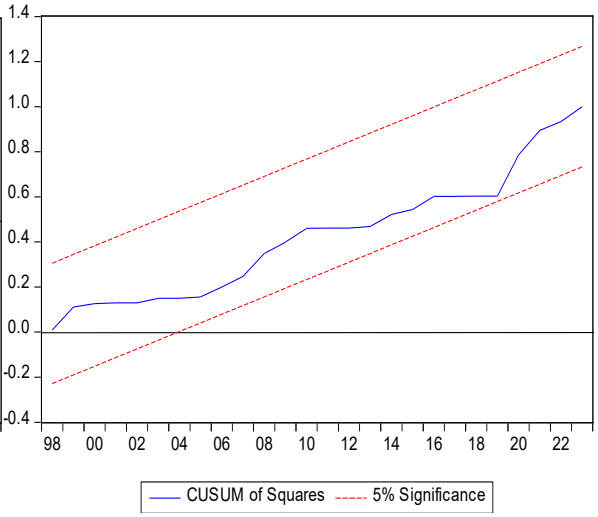


Fig (05): Results of (CUSUM of Squares) Test



Source: Prepared by the researchers based on EViews 10 outputs.

Through the results shown in Figure (04) and Figure (05), we observe that the statistic of both the Cumulative Sum of Recursive Residuals test and the Cumulative Sum of Squares of Recursive Residuals, which is represented by a median line, falls within the critical bounds (the upper bound and the lower bound) at a 5% significance level, and this is considered strong statistical evidence of the structural stability of the estimated model parameters in the short and long terms, and confirms the absence of sudden structural changes in the relationship between economic growth and its studied determinants, which enhances the validity of the model for forecasting purposes and formulating future economic policies.

4.2.7. Causality Direction Test:

After detecting the existence of a cointegration relationship between economic growth and the explanatory variables in our model in the long run, it becomes necessary to diagnose

the causal direction of this relationship, and to know which of the variables leads the other, and to achieve this, we will rely in our study on the Granger Causality Test (Granger, 1969), which is considered a pivotal econometric tool in economic studies to move beyond the concept of mere correlation towards the concept of influence and predictive power (Stern, 2011), and this test primarily aims to determine the predictive ability of one variable towards another, where it is said that variable (X) Granger-causes variable (Y) if including the past values of (X) in the regression model substantially reduces the prediction error of the current values of (Y) compared to relying on the past of (Y) only (ElemUche & others, 2018, p. 120), and the importance of this test is highlighted in resolving the theoretical controversy regarding the direction of influence (does economic growth lead consumption or vice versa?), which helps the decision-maker to identify target variables and dependent ones when formulating economic policies (Wang , 2020), and the following table illustrates the results of the causality test between household consumption and economic growth in Algeria during the study period:

Table (08): Results of the Causality Direction Test between Household Consumption and Economic Growth

Pairwise Granger Causality Tests
Date: 12/05/25 Time: 02:10
Sample: 1990 2023
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LHCE does not Granger Cause LRGDP	32	1.61254	0.2180
LRGDP does not Granger Cause LHCE		6.24393	0.0059

Source: Prepared by the researchers based on EViews 10 outputs.

The outputs of the Granger causality test shown in the table above indicate the following results regarding the pivotal relationship between economic growth and household consumption:

- **Causality direction from Economic Growth (RGDP) towards Household Consumption (HCE):** We observe that the probability value (Prob) accompanying the null hypothesis stating that Gross Domestic Product does not cause household consumption growth reached 0.0059, which is a value much lower than the 5% significance level, and based on this, we reject the null hypothesis and accept the existence of a significant causal relationship heading from economic growth towards household consumption.
- **Causality direction from Household Consumption (HCE) towards Economic Growth (RGDP):** In contrast, the probability value for the reverse hypothesis stating that household consumption growth does not cause economic growth reached about 0.2180, which is greater than 0.05, which means accepting the null hypothesis and the absence of a causal relationship heading from consumption towards growth, and these results confirm the existence of a unidirectional causal relationship running from economic growth to household consumption, and this result agrees completely with the Keynesian Absolute Income Theory which sees that consumption is a dependent function of income (C = f(Y)), as in the Algerian economy, economic growth (often driven by government expenditure and hydrocarbon revenues) is considered the primary source for generating disposable income for individuals, which in turn determines their consumption levels.

As for the absence of causality in the opposite direction, it reinforces what we reached previously in the results of our study model (ARDL), where household consumption in Algeria does not play the role of the locomotive leading economic growth but is rather a dependent variable, and this can be interpreted by the weak elasticity of the local productive apparatus, where a large part of consumer demand is directed towards imports (income leakage), which weakens the ability of household consumption to stimulate local production and create a self-sustaining growth cycle.

Conclusion:

We aimed within our research paper to analyse and measure the impact of household consumption on economic growth in Algeria during the study period, using the modern econometric approach represented by the Autoregressive Distributed Lag (ARDL) model and the Granger Causality test. The theoretical study and econometric analysis led to a set of results and recommendations, which we summarize as follows:

First: Study Results (Conclusions)

1. The Unit Root results of the Augmented Dickey-Fuller test showed that the study variables were all stationary at first differences and integrated of order one I (1).
2. The Bounds Test proved the existence of a long-run equilibrium relationship (cointegration) between Gross Domestic Product and its determinants (household consumption, investment, government expenditure).
3. The ARDL model estimates showed that government expenditure is the most influential and significant variable in explaining economic growth in Algeria, which confirms the rentier nature of the economy where the state plays the pivotal role in moving the wheel of economic development.
4. The results indicated a weak or insignificant impact of household consumption on economic growth in the long run, which refutes the hypothesis of consumption-led economic growth within the Algerian economy.
5. The estimation results in the short run revealed the existence of a positive and significant impact of household consumption on economic growth. This result reflects the traditional Keynesian theory where consumption is considered a main component of aggregate demand, and its increase leads to stimulating economic activity in an instantaneous and direct manner.
6. The Granger causality test revealed the existence of a unidirectional causal relationship heading from economic growth towards household consumption and not vice versa. This result means that household consumption in Algeria is a variable "dependent" on growth (which is driven by hydrocarbon revenues) and not a driver of it. This is due to the weak elasticity of the local productive apparatus, as the increase in consumer demand leaks abroad via imports instead of stimulating national production, which makes it consumption that is unproductive of locally added growth.

Second: Study Recommendations

Based on the foregoing, and to activate the role of household consumption as a real engine for growth instead of being merely a byproduct of rent, we recommend the following:

- Working on Import Substitution: The necessity of directing industrial and agricultural policies towards supporting local industry and agriculture that produce widely demanded

consumer goods, to ensure that an increase in household consumption leads to stimulating local factories rather than foreign ones.

- Improving the Investment Climate: Encouraging private investment to raise the elasticity of local supply, so that it responds to increasing demand without resorting to imports, thereby creating a closed "income-consumption-production" loop within the national economy.
- Rationalizing the Consumption Pattern: Activating fiscal and customs policy tools to limit the consumption of imported luxury goods and directing household expenditure towards locally produced goods.

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