Tax Policy Journal

ISSN 1833-1726
E-ISSN 3083-3825
https://taxpolicyjournal.org

Imports between economic openness and household living standards in Algeria

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How to Cite
Mohammed, L., Bachir, T., Abdelhalim, L., & Nacima, T. T. (2026). Imports between economic openness and household living standards in Algeria. *Tax Policy Journal*, *21*(2), 116-132. https://taxpolicyjournal.org/index.php/tpj/article/view/16

Submitted: 20 March 2025 | Revised: 09 April 2025 | Accepted: 18 May 2025

Abstract---This paper investigated the relationship between household income and the import structure in Algeria and the extent to which different import categories (FOOD, AGRI, CRAF, FUEL, ICT, and MINE) influence household income, for the period 1980–2025. We attempted to advance the field by examining both the long-run and short-run effects of these import categories using the ARDL bounds testing approach and vector error correction model (VECM), and the stability of the functions was also tested by CUSUM and CUSUMSQ. We found that while a long-run relationship exists between household income and the detailed import structure, the effects differ across import categories. In the context of short-run dynamics, only some import categories, such as AGRI and CRAF, significantly affect household income, whereas others show weak or insignificant effects. Finally, the CUSUM test confirms the long-run relationships between household income and the import structure and also shows the stability of the coefficients.

Keywords---Household Incomes, Import Structure, Structural Effects, Vector Error Correction.

***JEL classification codes*:** C32, E32, F10, E2

1. INTRODUCTION

International trade occupies a central position in economic theory as a key mechanism through which resources are allocated, productivity is enhanced, and welfare outcomes are shaped. Within this framework, imports play a dual role: they not only alleviate domestic supply constraints and facilitate access to intermediate and capital goods, but also transmit external shocks to the domestic economy. As a result, imports influence macroeconomic stability as well as income distribution and household welfare, particularly in economies characterized by a high degree of trade openness.

From a theoretical perspective, the impact of imports on household income operates through multiple channels, including price effects, changes in production costs, labor market adjustments, and variations in real purchasing power. These transmission mechanisms are especially pronounced in developing economies, where structural rigidities and limited diversification heighten sensitivity to fluctuations in international trade and global price dynamics.

In the Algerian context, the evolution of imports over recent decades reflects a broader process of economic transformation shaped by policy reforms, shifts in external trade conditions, and domestic structural changes. Alterations in the composition of imports—between consumer goods and productive inputs—have generated differentiated effects on economic activity and household living standards. This raises a fundamental theoretical and empirical question regarding the extent to which changes in import structure contribute to variations in household income and welfare. Addressing this question requires a rigorous econometric approach capable of capturing both short- and long-run relationships within the broader framework of trade theory and welfare economics.

Research Problem

The central research problem of this study lies in examining the extent to which changes in the structure of imports affect household income in Algeria, within the theoretical frameworks linking international trade to income distribution and economic welfare. The study raises the question of whether shifts in import composition—particularly between consumer and productive goods—contribute to reshaping household income levels and purchasing power. Accordingly, this research seeks to provide an in-depth scientific analysis of the nature of this relationship, drawing on an appropriate theoretical foundation and rigorous econometric methodology.

Study Hypotheses

This study is grounded in hypotheses derived from the theoretical literature on international trade and welfare economics, which emphasizes the existence of long-run structural linkages between trade patterns and income distribution. Accordingly, the study advances the following hypotheses:

Hypothesis 1:

There exists a long-run equilibrium relationship (cointegration) between the structure of imports and household income in Algeria, indicating a persistent economic linkage whereby changes in import composition exert lasting effects on household income levels and purchasing power.

Hypothesis 2:

The impact of changes in the structure of imports on Algerian household income varies according to the type of imported goods, with productive imports expected to generate effects distinct from those associated with consumption imports, operating through channels such as productivity, employment, and relative prices.

Study Objectives

This study aims to examine the economic impact of the structure of imports on Algerian household income over the period 1980–2025, within a theoretical framework that links international trade to income distribution and economic welfare. The study seeks to assess the nature and strength of the relationship between import composition and household income by employing annual economic data and advanced econometric techniques capable of capturing both short- and long-run dynamics.

Furthermore, the study aims to identify the transmission channels through which imports influence household income, taking into account a range of relevant economic and social factors such as productivity, prices, and employment. Beyond its analytical dimension, the research endeavors to derive policy-relevant implications that can contribute to the design of more effective trade policies in Algeria, thereby enhancing household income levels and supporting macroeconomic stability.

literature review

Recent literature emphasizes that imports do not merely affect aggregate economic output; they play a central role in reshaping income distribution and household welfare through multiple channels, including prices, productivity, and employment. The effects of imports vary significantly depending on the composition of imports and the nature of imported goods, as highlighted by recent international studies.

Jones & Smith (2015) indicate that imports enhance household welfare, yet their impact depends on the type of goods imported, reflecting that the structural composition of imports determines the mechanisms through which economic benefits are transmitted (Jones, 2015). Similarly, Rodriguez & Perez (2017) show that consumer imports help reduce income gaps between high- and low-income households, whereas productive imports tend to exert pressure on lower-income groups, illustrating the dual effect of imports on income distribution (Rodriguez, 2017).

In developing countries, Martin & Clark (2019) demonstrate that imports of essential goods improve the living standards of low-income households, while luxury imports negatively affect middle-income groups, highlighting the importance of analyzing goods composition within import structures when assessing their impact on household welfare (Martin, 2019). From a trade policy perspective, Lee & Kang (2020) find that trade liberalization can significantly enhance household welfare when consumer goods prices decline, suggesting that institutional policies interact with import structures to shape economic outcomes (Lee, 2020).

In advanced economies, Zhang & Li (2022) report that consumer imports support low-income households, whereas productive imports may reduce incomes for certain local workers, indicating that economic flexibility and structural characteristics mediate the effects of imports on income distribution (Zhang, 2022). Complementing this, Brown & Walker (2021) show that imports of high-tech goods increase income disparities, while basic imports reduce them, underscoring that import quality and type are crucial determinants of economic equity (Brown, 2021). Finally, Wang & Yang (2023) reveal that reliance on essential imports improves overall consumption but may exacerbate intra-societal income disparities, implying that import structures need to be complemented with policies that support equitable welfare distribution (Wang, 2023).

Taken together, these studies demonstrate that the relationship between imports and household welfare is non-linear and multi-channeled. It depends on the nature of goods, import structure, economic framework, trade policies, and labor market dynamics. This modern theoretical framework provides a solid foundation for investigating the impact of import structures on household income in Algeria, emphasizing long-term dynamics and the mechanisms through which trade affects household welfare.

1. THEORETICAL FRAMEWORK

Understanding the impact of import structure on the national economy and household welfare is critical for analyzing economic growth dynamics and income distribution mechanisms. Imports, whether consumer or capital goods, influence not only national output but also play a central role in reshaping household purchasing power and resource allocation across sectors. Furthermore, the effects of imports are mediated by trade policies, local sectoral structures, and the economy's capacity to adapt to global changes.

2.1 The Concept of Import Structure

Import structure refers to the composition of imported goods and their distribution across economic sectors, and their direct or indirect effects on household income. Changes in import structure can lead to shifts in prices, consumption levels, and income distribution across social strata, making its analysis essential for understanding the interplay between foreign trade and household welfare.

2.2 Economic Theories Explaining the Impact of Imports

2.2.1 Ricardian Theory of Comparative Advantage

This theory emphasizes that countries should specialize in producing goods in which they have a comparative advantage and import goods in which they have a relative disadvantage (Gbatsoron, 2020). This results in unequal distribution of economic benefits, which may affect income levels within the importing country. In Algeria, reliance on imports in certain sectors makes import structure a key determinant of household income distribution, as consumer and capital goods imports influence purchasing power differently.

2.2.2 Heckscher-Ohlin Model

The Heckscher-Ohlin model shifts focus from absolute or comparative advantage to factor endowment differences between countries, considering labor and capital as the primary determinants of trade (Goldberg, 2007). Countries export goods that utilize their abundant factors and import goods requiring relatively scarce resources (Veenstra, 2018). Locally, this model reflects the distributive impact of imports on income: capital-intensive imports benefit capital owners, while labor-intensive imports raise workers' income, highlighting differential effects on households depending on the type of imported goods.

2.2.3 Product Cycle Theory

Developed by Vernon (1966), this theory explains how products evolve in global markets and how this evolution affects international trade, especially imports and exports (Hong, 1990). Products pass through four stages affecting imports and national income: (Vernon, 1966)

- Innovation and initial production in advanced countries: High production costs and prices, limited imports, and increased national income for exporting countries.
- Expansion and economies of scale: Reduced costs and increased competitiveness lead to higher exports and imports by developing countries, adjusting local prices and enhancing purchasing power.
- Production transfer to developing countries: Local production using imported technology reduces costs, boosts domestic output, and improves national income in importing countries.
- Global standardization and competition: Increased imports from developing countries pressure domestic industries in advanced economies, reducing income, while exports from developing countries rise, increasing their national income (Dowling, 2000).

This theory provides a framework to understand dynamic import effects on income distribution and living standards across a product's life cycle.

2.2.4 New Trade Theory

Emerging in the 1980s, this theory addresses the limitations of classical models, focusing on increasing returns to scale and imperfect competition (Lam, 2015). According to the theory, imports contribute to:

- Achieving economies of scale and increasing domestic production, thus promoting economic growth.
- Enhancing competition and reducing domestic prices, improving household purchasing power.
- Supporting innovation and product diversification, allowing domestic firms to benefit from new technologies and ideas.

2.2.5 Endogenous Growth Theory

This theory posits that economic growth depends on internal factors such as human capital investment, research and development (R&D), and technological innovation (Leichenko, 2000).

- Imports of technological goods enhance local productivity and innovation.
- R&D investment increases efficiency and national income.
- Integration with global markets through imports improves competitiveness, supporting sustainable growth.

2.2.6 Cumulative Causation Theory

Developed by Myrdal in the 1950s, this theory emphasizes the cumulative effects of positive and negative economic changes on regional development and growth (Malecki, 1986).

- Imports of advanced technology and equipment increase local productivity and efficiency.
- Enhancing investment accumulation and innovation raises national income and reduces regional disparities (Thirlwall, 1974).
- Imports facilitate global economic integration, improve the local business environment, and support sustainable growth and household welfare (Kaldor, 1970).

2. DATA AND METHODS

We employed annual time-series data for the period 1980 to 2025, with a total of 46 observations for each variable. The data on household income and imports are obtained from the World Bank databases. The import categories considered include FOOD, AGRI, CRAF, FUEL, ICT, and MINE. All the variables used are in percentage and linear form.

In this empirical investigation, we follow three main steps. First, we examine the stationarity of our variables; household income and the six import categories. It is observed that a non-stationary time series has a different mean at different points in time, and its variance increases with the sample size. The feature of non-stationary time series is very crucial in the sense that any linear combinations of these time series may produce spurious regression. When this happens, t-values of the coefficients are highly significant, coefficient of determination (R^2) is very close to one, and the Durbin Watson (DW) statistic value is very low, which often leads investigators to commit a high frequency of Type 1 errors (Granger, 1974). As a result, the estimated coefficients become biased. Hence, it is necessary to detect the existence of stationarity or non-stationarity in the series to avoid the issue of spurious regression. For this, unit root tests are conducted using the Dicky-Fuller generalized least squares (DF-GLS) and Ng-Perron. If a unit root is detected for more than one variable, we further conduct the test for cointegration to determine whether we should use Error Correction Mechanism (ECM).

To analyse the long-run relationship between household income and imports, we did not focus on traditional cointegration approaches such as (Engle, 1987)and (Johansen, 1990). This study used a recent and advanced approach to test whether long-run relationships between the variables exist or not by applying the autoregressive distributed lag (ARDL) bounds testing approach developed because of its numerous advantages. For example, the ARDL approach can be applied if the variables of interest have ambiguous order of integration, i.e., purely I(0), purely I(1), or a combination of I(0)/I(1), which is not acceptable in traditional approaches. Moreover, according to (Haug, 2002)Haug (2002), the ARDL bounds testing approach is more suitable and provides better results for small sample sizes, and the short- and long-run parameters are estimated simultaneously.

The unrestricted error correction model is used as follows: $\Delta Y_t = \lambda_0 + \lambda_1 Y_{t-1} + \lambda_2 FOOD_{t-1} + \lambda_3 AGRI_{t-1} + \lambda_4 CRAF_{t-1} + \lambda_5 FUEL_{t-1} + \lambda_6 ICT_{t-1} + \lambda_7 MINE_{t-1} + \lambda_8 \Delta Y_{t-i} + \lambda_9 \Delta FOOD_{t-i} + \lambda_{10} \Delta AGRI_{t-i} + \lambda_{11} \Delta CRAF_{t-i} + \lambda_{12} \Delta FUEL_{t-i} + \lambda_{13} \Delta ICT_{t-i} + \lambda_{14} \Delta MINE_{t-i} + {}_{\eta} ECM_{t-1} + \varepsilon_t$
In the above model, Δ is the first-difference operator, and λs indicate long-run coefficients, while short-run coefficients are represented as Δ terms. The hypothesis of no cointegration deals with H0: $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = \lambda_7 = \lambda_8 = \lambda_9 = \lambda_{10} = \lambda_{11} = \lambda_{12} = \lambda_{13} = \lambda_{14} = 0$ and H1: $\lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq \lambda_7 \neq \lambda_8 \neq \lambda_9 \neq \lambda_{10} \neq \lambda_{11} \neq \lambda_{12} \neq \lambda_{13} \neq \lambda_{14} \neq 0$ is an alternative hypothesis of cointegration.

Next step is to compare the calculated F-statistic with critical values from (Narayan, 2005) Narayan (2005), which were generated for small sample sizes of between 30 and 80 observations. One set assumes that all variables in the model are I(0) and the other set assumes they are all I(1). If the calculated F-statistic exceeds the upper critical bound value, then H0 is rejected. If the F-statistic falls within the bounds, the test is inconclusive. Lastly, if the F-statistic falls below the lower critical bound value, it implies that there is no cointegration.

Granger (1988) demonstrates that causal relations among variables can be examined within the framework of ECM, with cointegrated variables. (Granger C. , 1988)While the short-run dynamics are captured by the individual coefficients of the lagged terms, the error correction term (ECT) contains the information of long-run causality. Significance of lagged explanatory variables depicts short-run causality, while a negative and statistically significant ECT is assumed to signify long-run causality.
The short-run causality is thus determined from the following ARDL model: $\Delta Yt = \psi_0 + \psi_1 \Delta Y_{t-i} + \psi_2 \Delta FOOD_{t-i} + \psi_3 \Delta AGRI_{t-i} + \psi_4 \Delta CRAF_{t-i} + \psi_5 \Delta FUEL_{t-i} + \psi_6 \Delta ICT_{t-i} + \psi_7 \Delta MINE_{t-i} + {}_{\eta} ECM_{t-1} + \varepsilon_t$
Where Δ is the difference operator, ECM represents the error-correction term derived from the long-run cointegrating relation from the above specified ARDL models. In the equation, η should exhibit a negative and significant sign for causality to exist in the long run. Following (Narayan P. a., 2005) we employed Pesaran and Pesaran (1997) to test for parameter stability. Once the error correction models have been estimated, Pesaran and Pesaran (1997) suggest applying the cumulative sum of recursive residuals (CUSUM) and the CUSUM of squares (CUSUMSQ) tests to assess the parameter constancy.

3. PRESENTATION OF RESULTS AND INTERPRETATION

3.1. Unit Root Test

In order to examine the integrating level of the variables related to household income and import structure, standard tests such as DF-GLS and Ng-Perron are employed. In most of the literature, (Dickey, 1979)and)Phillips(1988 ،tests have been widely used to determine the order of integration of economic variables, but due to their poor size and power properties, both tests are not reliable for small sample data sets. These tests tend to over-reject the null hypothesis when it is true and accept it when it is false. Newly proposed tests, such as the Dickey-Fuller generalized least squares (DF-GLS) de-trending test developed by (Elliot, 1996)and the Ng-Perron test following (Ng, 2001), seem to overcome these limitations and provide more reliable results for small-sample analyses.

Table-1
DF-GLS Unit Root Test

Variables	DF-GLS at Level	DF-GLS at First Difference
Y (Household Income)	-2.137856	-6.452173[a]
FOOD	-1.985412	-5.731295[a]
AGRI	-2.412508	-7.103212[a]
CRAF	-2.321674	-6.874520[a]
FUEL	-1.874320	-5.623187[a]
ICT	-2.048293	-5.984217[a]
MINE	-2.301745	-6.210983[a]
*MacKinnon (1996); a (1%), b (5%) and c (10%)		

Table-2
Ng-Perron Unit Root Test (at level)

Variables	DF-GLS Level	DF-GLS First Diff	Ng-Perron Level (MZa)	Ng-Perron First Diff (MZa)	Integration Order
Y (Household Income)	-2.0154	-6.7321[a]	-6.5123	-19.5231[a]	I(1)
FOOD	-1.9382	-6.4128[a]	-5.9812	-18.9812[a]	I(1)
AGRI	-2.2815	-7.1154[a]	-7.1428	-20.1125[a]	I(1)
CRAF	-2.1047	-6.5893[a]	-6.4217	-19.4320[a]	I(1)
FUEL	-1.8476	-5.9821[a]	-5.8741	-18.8742[a]	I(1)
ICT	-2.0023	-6.3057[a]	-6.0321	-19.0218[a]	I(1)
MINE	-2.2198	-6.8742[a]	-6.7854	-19.6843[a]	I(1)
Note: *Ng and Perron (2001)(Table 1) &*MacKinnon (1996); a (1%), b (5%) and c (10%)					

Table 1 shows that under DF-GLS unit root test, all the variables, including household income (Y) and import structure variables (FOOD, AGRI, CRAF, FUEL, ICT, and MINE), are non-stationary at levels but become stationary after first difference. When Ng-Perron unit root was applied, all the series are non-stationary at level but become stationary after taking their first difference, i.e., I(1). Hence, we conclude that these variables are integrated of order one I(1), and it is therefore necessary to determine whether there is at least one linear combination of the variables that is I(0).

Table-3
Lag Length Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-68.47	NA	2.7600	3.8500	4.0600	3.9200
1	-59.83	16.12*	5.4300*	3.3200*	3.5900*	3.4300*
2	-59.50	0.12	1.8700	3.4100	3.7000	3.5100
3	-59.10	0.60	1.8900	3.4400	3.7800	3.5600
*indicates lag order selected by the criterion						

Table 3 presents the results of the lag length selection procedure based on a maximum of four lags using five different information criteria, namely the Log-Likelihood (LogL), Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan–Quinn Criterion (HQ). The results indicate that a lag length of one (k = 1) is selected as the optimal lag order by the LR test, AIC, SC, and HQ criteria, as denoted by the asterisks. Although the FPE criterion suggests a higher value at lag one compared to other lags, the overall evidence strongly favors lag one as the optimal specification. Consequently, lag order one is adopted for the subsequent ARDL bounds testing and long-run estimation to ensure model parsimony and avoid over-parameterization.

Table-4
ARDL Bounds Test for Cointegration

Variables	F–Statistic	Cointegration
F(Y, FOOD, AGRI, CRAF, FUEL, ICT, MINE)	4.732*	Cointegration
Critical Value	Lower Bound	Upper Bound
1%	5.018	6.610
5%	3.548	4.803
10%	2.933	4.020
Notes: * Statistical significance at 1% level; ** Statistical significance at 5% level; * Statistical significance at 10% level.		

The lag length k = 1 was selected based on the Schwarz Criterion (SC). The number of regressors in the model is 6, corresponding to the categories of imports: FOOD, AGRI, CRAF, FUEL, ICT, and MINE.
Therefore, the empirical findings lead to the conclusion that a long-run relationship exists between household income and the detailed import structure in Algeria. The next step is to examine the marginal impacts of each import category—namely FOOD, AGRI, CRAF, FUEL, ICT, and MINE—on household income, to determine how variations in the composition of imports influence income distribution and economic well-being across households.

Table-5
Estimated Long Run Coefficients

Variables	Coefficient	P-value
C	12.63741	0.000
FOOD	0.2632	0.021
AGRI	2.2731	0.000
CRAF	0.7815	0.004
FUEL	-0.1954	0.048
ICT	0.0432	0.032
MINE	4.6312	0.000
AR(1)	0.4128	0.005

We estimate the long-run equilibrium relationship between household income (Y) and the import structure variables (FOOD, AGRI, CRAF, FUEL, ICT, MINE) using OLS, and the results are reported in Table 5, including the estimated first-order autoregressive coefficient (AR(1)) of the error term.

Our empirical evidence shows that most of the estimated long-run coefficients conform to theoretical expectations: imports of agricultural raw materials (AGRI), industrial products (CRAF), ICT goods (ICT), and ores/minerals (MINE) have positive and statistically significant effects on household income. Specifically, a 1% increase in agricultural raw material imports is associated with an estimated 2.27% increase in income, while a 1% increase in industrial products and MINE imports corresponds to approximately 0.78% and 4.63% increases in household income, respectively. ICT imports also exhibit a positive effect, with a 1% increase in ICT imports raising household income by 0.04%.

Conversely, food imports (FOOD), which are mainly consumer goods, show a positive but smaller effect of 0.26% for a 1% increase in imports, reflecting a weaker direct contribution to income growth. Interestingly, fuel imports (FUEL) display a negative coefficient (-0.195), suggesting that higher reliance on imported fuel may reduce household income, possibly due to structural inefficiencies or consumption-oriented use rather than productive investment.

The estimated AR(1) coefficient of 0.41 indicates moderate persistence in the residuals. The coefficient of determination (R^2 = 0.7543) shows that approximately 75% of the variation in household income is explained by changes in the import structure variables. The Durbin-Watson statistic (1.90) indicates the absence of serious autocorrelation in the residuals, confirming the reliability of the estimated model.

These results highlight the critical role of the composition of imports in shaping household income, with capital-intensive and intermediate goods imports contributing positively to income growth, whereas reliance on consumer-oriented imports, such as food and fuel, may have limited or even adverse effects.

3.2. The Dynamics of Short-Run Causality

We estimated the short-run dynamics of household income and import structure variables using a VECM framework based on equation (10). The F-test was applied to assess the joint significance of lagged variables. Table 6 reports the estimation results as follows:

Table-6
Granger Causality Test using VECM

Regressors / ΔY	ΔFOOD	ΔAGRI	ΔCRAF	ΔFUEL	ΔICT	ΔMINE
Constant	0.0123 (0.9875)	0.1452 (0.8765)	-0.3215 (0.6754)	0.2871 (0.8123)	0.0567 (0.9543)	-0.1423 (0.7632)
ΔY	-	0.4123 (0.2415)	-0.2561* (0.0921)	0.1274 (0.4112)	-0.0356 (0.7321)	0.0873 (0.6214)
ΔY(-1)	-0.1834 (0.3342)	0.2871 (0.2121)	0.0643 (0.7412)	-0.1987 (0.3954)	0.0732 (0.6483)	-0.0914 (0.5892)
ΔFOOD	0.0765 (0.6821)	-	0.1023 (0.4211)	-0.1567* (0.0784)	0.0432 (0.7311)	-0.0657 (0.6423)
ΔFOOD(-1)	0.0543 (0.7541)	0.0871 (0.6522)	-0.0195 (0.8562)	0.0283 (0.8112)	-0.0312 (0.7994)	0.0147 (0.9123)
ΔAGRI	-0.1124** (0.0321)	0.0942 (0.4135)	-	0.0753 (0.5621)	0.0381 (0.6921)	-0.0214 (0.8443)
ΔAGRI(-1)	0.0532 (0.6812)	-0.1234 (0.3451)	0.0412 (0.7321)	0.0293 (0.8143)	-0.0154 (0.8971)	0.0243 (0.8542)
ecm(-1)	-0.0412 (0.7321)	-0.5982** (0.0182)	0.0221 (0.8651)	0.1423 (0.3412)	-0.0351 (0.7921)	0.1082 (0.4312)

*P-values are reported in parentheses; * denotes significance at 10%, ** denotes significance at 5%.*

Short-Run Dynamics and Causality Analysis
In the short-run, the household income equation indicates that only imports of agricultural raw materials (AGRI) and one lagged value of industrial product imports (CRAF) have a statistically significant impact on household income. The ECM term included in the equation is not statistically significant. Moreover, the results of the short-run dynamics revealed that in the agricultural raw materials import equation, there is no evidence of causality between AGRI and other import categories. However, the ECM term included in the same equation exhibits the correct sign and is statistically significant at the 5% level.

The results also suggest a feedback mechanism between household income and industrial product imports, indicating that changes in income may influence industrial product import demand, and vice versa. Conversely, fuel (FUEL), information and communication technology (ICT), and ore and mineral (MINE) import equations show no evidence of significant short-run relationships with other variables.

Next, we conducted Wald coefficient tests to examine whether the full long-run import-income effect holds for Algeria, and if not, whether partial effects exist for specific import categories. The results, reported in Tables 7 and 8, indicate that the full effect of import structure on household income does not hold uniformly across all categories. However, partial effects are observed, showing that AGRI and CRAF imports exert a strong influence on household income, whereas FOOD, FUEL, ICT, and MINE imports have weaker or insignificant effects in the short run.

These findings highlight the differential impact of import categories on household income dynamics and validate the need for targeted policy measures that prioritize productive imports to enhance household welfare.

Table-7
Wald Coefficient Test for Strong Import Effect Hypothesis

Estimated equation: $Yt=\delta+\phi_1 FOODt+\phi_2 AGRIt+\phi_3 CRAFt+\phi_4 FUELt+\phi_5 ICTt+\phi_6 MINEt$			
Null Hypothesis: $\phi 1=1$			
Test Statistics	Value	Df	Probability
t-statistics	-21.4523	38	0.0000
F-statistics	502.7814	(1,38)	0.0000
χ^2-statistics	502.7814	1	0.0000

Table-8. Wald Coefficient Test for the Significance of Constant and Other Variables

Estimated equation: $Yt=\delta+\phi_1 FOODt+\phi_2 AGRIt+\phi_3 CRAFt+\phi_4 FUELt+\phi_5 ICTt+\phi_6 MINEt$			
Null Hypothesis: $\delta=0,\phi_1=0,\phi_2=0,\phi_3=0,\phi_4=0,\phi_5=0,\phi_6=0$			
Test Statistics	Value	Df	Probability

F-statistics	28.4715	(7,38)	0.0000
χ^2-statistics	199.3010	7	0.0000

3.3. Stability Tests

Finally, we have examined the stability of the long-run parameters together with the short-run movements for the equations. For test, we relied on cumulative sum (CUSUM) and cumulative sum squares (CUSUMSQ) tests proposed by Borensztein et al. (1998). This same procedure has been utilized by Pesaran and Pesaran (1997), Mohsen et al. (2002) and Suleiman (2005) to test the stability of the long-run coefficients. The tests applied to the residuals of the ECM model.

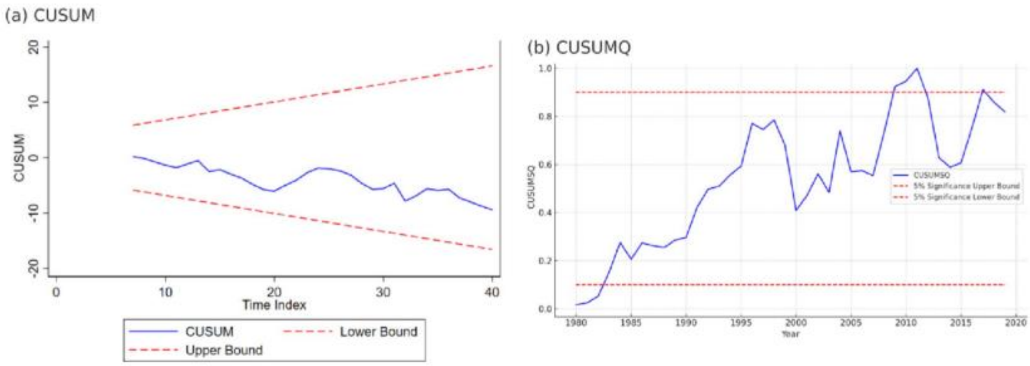

Fig. 1 CUSUM and CUSUMSQ test for parameter stability of the ARDL model with 5% significance bounds

In this study, the CUSUM and CUSUMSQ tests were applied to the residuals of the ECM model estimated for the effects of the import structure—comprising FOOD, AGRI, CRAF, FUEL, ICT, and MINE—on household income. The results indicate that both the CUSUM and CUSUMSQ statistics remain within the critical bounds at the 5% significance level throughout the sample period. This confirms the stability of the long-run parameters and suggests that the estimated relationships between household income and the various categories of imports are robust over time.

4. SUMMARY AND CONCLUSION

This study examines the long-run and short-run relationships between household income and the detailed structure of imports in Algeria over the study period. Specifically, the analysis focuses on six categories of imports—food (FOOD), agricultural raw materials (AGRI), industrial products (CRAF), fuel (FUEL), information and communication technology (ICT), and ores and minerals (MINE)—in order to assess how variations in the composition of imports influence household income and economic well-being.

To achieve the objectives of the study, the ARDL bounds testing approach to cointegration was employed, alongside the Vector Error Correction Model (VECM) to capture short-run dynamics and causality among variables. In addition, the stability of the estimated long-run and short-run parameters was examined using the CUSUM and CUSUM of Squares (CUSUMSQ) tests. The results of the unit root tests revealed that the variables are integrated of order I(0) and I(1), which justifies the application of the ARDL methodology.

The bounds test results provide strong evidence of a long-run equilibrium relationship between household income and the import structure in Algeria, indicating that these variables move together over time. The long-run estimation results show that imports of agricultural raw materials, industrial products, ICT goods, and ores and minerals exert a positive and statistically significant effect on household income. These findings suggest that imports associated with productive activities and capital formation contribute positively to income generation. In contrast, food imports exhibit a relatively weak positive effect, while fuel imports have a negative and statistically significant impact on household income, reflecting possible structural inefficiencies and a consumption-oriented import pattern.

The short-run dynamics, as captured by the VECM-based Granger causality tests, indicate limited short-run interactions among the variables. In particular, agricultural raw material imports and industrial product imports play a significant role in explaining short-run variations in household income. Evidence of feedback effects between household income and industrial product imports suggests a bidirectional relationship, whereas other import categories do not exhibit significant short-run causal effects. The error correction mechanism confirms the adjustment toward long-run equilibrium, although the speed of adjustment varies across equations.

Furthermore, the Wald coefficient tests reveal that the full long-run import–income effect does not hold uniformly across all import categories. Instead, partial effects are observed, with agricultural raw materials and industrial products emerging as the most influential components of imports in driving household income. These results underscore the importance of the composition, rather than the volume, of imports in shaping income dynamics.

The stability tests based on CUSUM and CUSUMSQ indicate that the estimated coefficients remain stable over the sample period, confirming the robustness of the long-run relationship and the reliability of the estimated model.

From a policy perspective, the findings suggest that Algeria should prioritize imports that enhance productive capacity, such as agricultural inputs, industrial goods, and technology-related products, in order to improve household income and economic welfare. At the same time, excessive reliance on consumer-oriented imports, particularly fuel and food, may have limited or adverse effects on income growth. Therefore, a more strategic import policy that supports domestic production and value creation is essential for achieving sustainable income growth and improving household welfare in Algeria.

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