

Increase of Food Imports and its Impact on Food Security In Algeria During the period (1983 – 2020)

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Received date: 30/10/2024;

Revised date: 11/04/2024 ;

Publication date: 31/12/2024

Summary: This study is about the value of food imports in Algeria which kept increasing year after year since the independence, and its impact on food security which became a goal most of the countries seek to achieve, especially under the current global economic changes.

The purpose of this study is to study the impact of the food imports increase on food security in Algeria during the period (1983 – 2020), this study concluded that food imports have a significant impact on food security levels in Algeria. The findings suggest that policies aimed at boosting domestic agricultural production and exports can contribute to enhancing food security in both the short and long run. Additionally, managing population growth and maintaining a stable exchange rate are crucial for ensuring long-term food security.

Keywords: food imports; food security; ARDL; Algeria.

Jel Classification Codes: F14 ; Q18; C3; O55.

Résumé : Cette étude porte sur la valeur des importations alimentaires en Algérie, qui n'ont cessé d'augmenter d'année en année depuis l'indépendance, et sur leur impact sur la sécurité alimentaire, qui est devenue un objectif que la plupart des pays cherchent à atteindre, en particulier dans le contexte des changements économiques mondiaux actuels.

Le but de cette étude est d'étudier l'impact de l'augmentation des importations alimentaires sur la sécurité alimentaire en Algérie au cours de la période (1983 – 2020), cette étude a conclu que les importations alimentaires ont un impact significatif sur les niveaux de sécurité alimentaire en Algérie. Les résultats suggèrent que les politiques visant à stimuler la production agricole nationale et les exportations peuvent contribuer à renforcer la sécurité alimentaire à court et à long terme. En outre, la gestion de la croissance démographique et le maintien d'un taux de change stable sont essentiels pour garantir la sécurité alimentaire à long terme.

mot-clé : importations de produits alimentaires ; sécurité Alimentaire; ARDL; Algérie.

JEL Code de classification : F14 ; Q18; C3; O55.

I- Introduction :

Food security issue is now at the core interest of the countries (Cherrou, 2023, p 971). Food security has become the most important topic of the discussions of experts and specialists and bodies during all meetings and events, and most important element of the sustainable development agenda, seeking to achieve zero hunger level (Siari & Djebli, 2023, p 29).

Food security question is considered a main issue in different countries and governments, thus most of countries strive to make foodstuff available to meet the needs of their populations in order to achieve its food security, especially under the current global economic changes and the multiple challenges it poses to developing countries.

The World Food Conference, held in Rome during November 1974, showed that hunger in the world has become a frightening reality, since the developing countries, especially those with continuous increasing food imports, are no longer able to face the deep deterioration in their food situation (Mohamedi & Hafsaoui, 2023, p 171) .

Food security question has become the biggest challenge for Algeria since it heavily depends on abroad to cover its food requirements which makes it exposed to a lot of prices fluctuations as a result to what occurs in global markets, during 2007-2008 food saw a staggering increase on global markets which negatively impacted local prices and food prices went high .

Algeria is considered among the countries suffering food security shortage; there was an increasing interest to food security issue lately, after the dependence on food imports became a prominent feature of Algerian economy, based on this we can put forward the following main questioning :

How far do food imports increase impacts food security in Algeria during the period?(2020-1983)

Study hypothesis:

In order in bring an answer to main questioning above, we put the following hypothesis

-Food imports in Algeria are positively linked to food security.

Purpose of the study:

The purpose of the study is to study the impact of food imports on food security in Algeria during the period.(2020 – 1983)

I.1.Previous studies

Study of Chikhaoui Souhila and Adala Laadjal (2018), modeling the forecasting of the value of Algerian food imports... Horizons 2022, the purpose of the study is to analyze and diagnose the factors defining food problem in Algeria, which impacted the value of its food imports increasing

year after year since the independence, for this reason their study was carried out in a descriptive and analytical way and was done as a standard modeling and level forecasting up to 2022 using “Box-Jenkins method”. The study concluded the behavior of food imports and the probable increase in its value during the coming years, which confirms that (t-1) in Algeria is defined by the previous period, Algeria heavily relies on imports in order to meet the increasing domestic demand for food, which clearly shows the weakness of agricultural production (Chikhaoui & Adala, 2018, p 78) .

Study of Molhassane Aïat Allah and Bougroura Salah (2017), title: Determinants of demand for Algerian food items during the period 1990-2011: vector autoregressive analysis, the study aims to define and analyze the most important variables explaining the behavior of food national imports during 1990 – 2011, after so many tries it was proven that the variables of income and domestic production level and also the real exchange rate are the most appropriate determinants, and the logarithmic formulation of estimation is the best during the study period, and it was proven from the analysis results, using portioning contrast and impulse response functions tools, that national income is the most important factor that defines the Algerian imports on the short term, but this response is largely regressing on the long term which means that national income is able to meet domestic needs of foreign food commodities but on the long term this ability fades, as for the domestic alternative or the amount of what is domestically produced came in contrast to economic theory contrary to what is was expected, regarding rate exchange it had no impact on imports and it is the same result many of the studies obtained especially those applied to developing countries (Moulhassan & Bougroura , 2017, p. 263).

Study of Mohamed Nour El Houda and Hafsaoui Nour El Houda (2023), title: Study of reality of food security in Algeria, this study addresses food security issue, which became a goal many countries seek to achieve, especially under current global economic changes and the multiple challenges they represent, within this scope, this study aims to diagnose the situation of Algeria regarding food security according to global food security indexes.

Based on the descriptive and analytical method and the special statistics, this study concluded that despite Algeria has achieved a relatively slight improvement on international ranking and in the Middle East and North Africa, according to Global Food Security Index, it is still below average and far from the required level according to Global Food Security Index (Mohamedi & Hafsaoui, 2023, p 170).

II– Methods and Materials:

II.1. Definition of imports

Imports term means all kinds of goods and services that are imported (Belabed, Twaiti & Mokaddem, 2019, p 151).

Imports are the purchases of local consumers of commodities and services produced abroad by foreigners (Guellouh & Talhi, 2023, p 890).

We can define imports as the service and commodities coming into the country in exchange of funds going outside (Chikhaoui & Narmi, 2022, p 79).

Imports represent a demand from residents inside any economy for commodities and services produced outside that economy (Ahmed Abdel-Rahman, 2019, p 387).

Usually, the concept of imports means the process of transferring a set of commodities and services from an external source to the interior of the State, imports are deemed very important in global trade since it represents its mainstay, also the import operations allow the economies to get the different commodities and services it lacks (Sahli, 2021, p 456) .

The imports, in the strict sense, represent the purchased commodities from the rest of the world in order to achieve benefits and satisfy the needs of domestic consumption, and it constitutes the debt part in the State's trade balance accounts, and represents a demand from the residents inside an economy for commodities and services produced outside that economy. In its broad sense, it is the value of all imported goods and services and capitals from the rest of the world, and it is included beside the debt part in the State's trade balance accounts, since the State is facing the issue of decreasing national income when paying the value of its imports (Djorfi, 2022, p 107) .

II.2. Determinants of demand on imports

1 -National income: most of economists emphasize, according to modern trends in economic thought, on national income factor as a main determinant among the determinants of demand for imports in open economies, since the demand for imports is considered a function of income (Selmi , 2015, p. 42).

2 -Prices: imports prices are considered among the main determinants of demand for imports volume, since the increase in prices leads to shrinks in demand, in return there will be an increase on domestic alternatives, which results in shrinking quantity and demand volume for imports, and vice versa in case the prices drop (Mahdjoubi & Souiah, 2023, p 165). There is a general understanding that income and prices variables are considered main determinants in the functions of demand for imports (Zerguine & Chibane, 2020, p 777)

3 -Exports: we can say that exports exert impact on imports on two aspects: first of them, the imports revenues of hard currency are usually used to build up reserves used to pay for imports, thus the increase in exports along with stability of other factors leads to the increase of importing capacity which results in increased imports. The other aspect is that industrial exports usually require raw materials and intermediate goods which might not be locally available and that requires importing them, consequently the increase in industrial exports requires increasing the imports of intermediate goods and raw materials (Boussisse , 2021, p. 101)

4 -Exchange rate: the fluctuations in exchange rate has fast impacts on trade influx, which might make the impact of real exchange rate fluctuations in the short term more important than the impact of imports prices on demand volume of imports, consequently the adaptation celerity of imports with exchange rates fluctuations is bigger than in the case of import prices, since the low price flexibility extends the adaptation or modification periods (Zaoui , 2020, p. 38).

5 -Foreign currency reserves: international reserves are that important for countries since they resort to them in case of absolute need in order to face external chocks, and use them to purchase a lot of consumer and intermediate goods and machines, all central banks in developed or developing countries keep a certain amount of foreign currencies accepted for fulfillment, to it is added a portion of gold so that it will be available when requested, consequently the countries are keen to build up these reserves in order to use them when an emergency shortfall in the payment balance occurs (Keroucha, 2018, p. 74).

II.3. General Framework of Food Security:

Food security term originated during the World Food Conference held in 1974, following the global food crisis that occurred between 1972 and 1974 (Benaissa & Benichou, 2023, p 751) .

II.3.1 Definition of food security:

Economic researchers differed on giving a unified and defined concept for food security, because the way they see food security is different, the modern concept of food security emerged during World Food Summit in 1966, as International Food and Agriculture Organization defines it in the article 1: “when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 1) (Mohamedi & Hafsaoui, 2023, p 173)

Arab Organization for Food Development defines food security as “making food available with the required quantity and quality for activity and health in a continuous way, for each individual of population groups based on local production, at first place, and on comparative advantage in commodities production of each nation and making it available for all population individuals with the prices that fit their income and financial capabilities” (Benchehida, 2023, p 99)

The World Bank defines food security as “when all people, at all times, have access to sufficient food for a healthy and active lifestyle. Its main elements are food availability and the ability to access it” (Ziadi, 2023, p 364)

According to World Health Organization: “Food security is defined under all circumstances and the necessary required standards, during the processes of production, manufacturing, stocking, distributing and preparing food, to guarantee that the food is safe, certified, healthy and fit for

human consumption. The same organization defines food crisis as a manifest shortage of food quantity and quality compared with reasonable levels defined by the minimum calories as defined by Food and Agriculture Organization (Ballalou & Larbi, 2023, p 546).

II.3.2 Some concepts relating to food security

Food and agricultural development attracted the interest of many thinkers on global and regional levels, in the midst of this interest emerged a lot of concepts for fundamental issues relating to food security.

II.3.2.1 Food insecurity :

There is food insecurity when people suffer malnutrition as a result of unavailability of food or lack of its access, and those are people whose food amounts are less than necessary needs from minimum calories (energy) and those people who show physical symptoms because of malnutrition and lack of energy resulting inability of the body to benefit from food, food insecurity is complicated phenomenon due to a wide range of different factors in terms of importance, these factors can be classified as economic, social, political, environmental, factors linked to economic performance and control procedures (Boulaassal , 2017, p. 74)

II.3.2.2 Sustainable food security:

The sustainability variant is considered the last of the variant included in food security concept, since the reports of FAO confirm that since the 70s food production started having a negative impact on environment resulting from excessive use of ground waters and the intensive use of fertilizers which caused the lands having less fertility and losing their natural elements, in addition to random use of insecticides (Hafnaoui, 2023, p 17)

Sustainable food systems are defined as food systems with low impact on environment, which contribute to the achievement of food and nutritional security, and also a healthy lifestyle for current and future generations (Boubakir, 2023, p 299)

Sustainable food security for a given country is defined as: “one of the strategic components of sustainable agricultural development, contained within the plan of sustainable economic and social development, which consists of several policies, programs and projects that would boost the productivity of fundamental food commodities, by ideal use of locally available resources and eliminating all forms of spoilage and waste from the producer to the consumer, rationalizing the consumption of food commodities and improving the commercial exchange conditions for these commodities and their production tools, be it exports of imports, while preserving ecological balance, preventing all sorts and forms of pollution, in order to achieve the highest possible degree of independence by reducing foreign dependence, thus targeting the availability of food

commodities with sufficient quantities and standard quality for all the population in different locations around the country with prices the fit their levels of income in a continuous and sustainable way” (Alhabitri , 2016, p. 44)

II.3.2.3 Self-sufficiency:

Self-sufficiency term was the most widely traded before food security term appeared, it is defined as the capability of the country to provide fundamental food necessities for all the population, through domestic production by exploiting agricultural resources available in the country which can be considered as a self achievement of food security, and dispensing with abroad to provide food needs (Zenagui , 2018, p. 7). Also, self-sufficiency is defined as “the capability of the society to achieve total self-reliance, and on its own resources and capabilities to locally produce food needs” (Mansour , 2016, p. 46)

II.3.2.4 Food gap:

Food gap is the quantity expression of food issue resulting from inability of local capacities to provide that quantity to cover nutritional needs shortage, it is defined as the amount of difference between self-produced food and the needed food to be consumed, also it is defined as inability to cover food commodities needs which can only be guaranteed by imports from abroad (Kemiti & Boufatih, 2019, p 25).

II.3.2.5 Food safety:

The World Health Organization concept of food safety means all the necessary conditions and standards to guarantee that food is safe, trusted, healthy and fit for human consumption; food safety depends on all the stages, from agricultural production till the moment of consumption by the final consumer (Boulaassal , 2017, p. 74).

II.3.2.6 Food dependence:

Food dependence is defined a mutual unequal dependence relationship in accessing of food, of which it results a growing domestic inability, growing reliance of the country dependent on external food resources in most crops that make up fundamental food for the population, und its submission to negative impacts resulting from the practices of the countries that monopolize and export food (Zenagui , 2018, p. 8).

II.3.3Categories of food security:

Some economists divide up food security to:

1 .Absolute food security: means producing food inside the same country with quantities equal or superior to domestic demand, known as self food security which is difficult to achieve and it hinders trade exchange operations between the countries which leads to the elimination of the relative quality existing in the country (Temar , 2017, p. 89)

2 .Relative food security: means the capacity of a given country or a group of countries to provide commodities and food items, totally or partially (Boukhari & Dridi, 2017, p 53). And it is the capacity to provide society needs of fundamental food commodities totally or partially, and to guarantee the minimum of these needs in a regular way (Ouaar & Douffi, 2021, p 68).

In view of the aforementioned, we conclude that food security concept does not necessarily mean the countries produce all their food needs, but it means make available food items offer in quantity and quality, either through domestic production or resorting to global markets, provided that the biggest food share is domestically produced. This anchor relies on the capacity of the countries regarding its ability to produce and/ or to resort to imports and on the efficiency of its marketing systems, and this comes under the following three elements (Mellal & Derbal, 2022, p 4):

-Domestic production of food commodities: fundamentally linked to availability of agricultural resources and followed agricultural policies and exploitation ways, also the available human, financial and technological resources. Since agriculture can play an important role in fighting hunger, malnutrition and poverty by increasing the availability of food locally and creating more employment opportunities that might boost purchasing power of poor people to get food.

-Food imports: they go along with commercial policies and relations and the extent of opening. They are exposed to the fluctuation of global prices and fluctuations of demand and offer in global markets.

- Marketing efficiency: its impacts the extent of food availability according to kind of markets, appropriateness of legislations and regulations in force, efficiency of managing strategic reserves, the availability of infrastructures in terms of transportation means, storage, manufacturing....

II– Methods and Materials:

This study aims to measure the impact of food imports on food security levels in Algeria during the period from 1983 to 2020. The analysis employs time series econometrics and follows a structured approach:

Stationarity Tests: Following the established practice in econometric analysis of time series, the study begins by examining the stationarity of the variables using the Phillips & Perron (1988) test. This test addresses the bias caused by random fluctuations through a non-parametric correction method that considers the conditional variance of errors.

Cointegration Tests: After confirming stationarity, the study proceeds with cointegration tests using the bounds testing approach proposed by Pesaran et al. (2001). This test offers the advantage of identifying cointegration relationships among a mix of variables that are stationary at levels and first differences.

ARDL Model: Models exhibiting cointegration are then estimated using the ARDL cointegration method developed by Pesaran et al. (1999). This method offers several advantages: It does not require variables to be integrated of the same order. It only requires that variables are not integrated of an order higher than one. It is considered more suitable for small samples due to its unbiasedness, efficiency, and ability to avoid autocorrelation problems. It allows for the separation of short-run and long-run effects. It identifies the cointegrating relationship between variables in both the long and short run within the same equation. It determines the magnitude of the impact of each independent variable on the dependent variable.

Model Specification: The study estimates equation (1) which includes the following variables:

$$lfsec_t = \beta_0 + \beta_1 lfm_t + \beta_2 lap_t + \beta_3 ltex_t + \beta_4 lexch_t + \beta_5 lpop_t + \beta_5 lgdpc_t + \varepsilon_t$$

Lfsec: Logarithm of per capita agricultural output (dependent variable),Lfm: Logarithm of food imports.,Lap: Logarithm of agricultural output.,Ltex: Logarithm of total exports.,Lexch: Logarithm of exchange rate.,Lpop: Logarithm of total population.,Lgpdpc: Logarithm of Gross Domestic Product., ε_t : Error term.

IV- Results and discussion :

IV.1Results:

To ensure the reliability and validity of our time series analysis, it is essential to test for the stationarity of each variable under study. Stationarity is a critical property in time series data, as it indicates that the statistical properties of the series, such as mean, variance, and autocorrelation, remain constant over time. Non-stationary time series can lead to misleading results and spurious relationships in regression analysis. Therefore, we apply unit root tests to determine the stationarity of the variables, which allows us to verify if they meet the conditions necessary for robust, meaningful econometric modeling. The following results outline the stationarity test outcomes for each variable in the analysis.

Unit Root Test Results (PP) (Table 1):

Variable	At Level		At First Difference	
	t-Statistic	p-value		
LFSEC	-1.2634	0.6361	-4.8295	0.0004
LFM	-0.6356	0.8503	-7.3557	0.0000
LAP	-0.9649	0.7555	-4.8134	0.0004
LTEX	-1.1674	0.6781	-4.7964	0.0004
LGDP	-1.1357	0.6912	-5.1589	0.0001
LEXCH	-1.1357	0.6912	-4.0769	0.0031
LEXP	-1.7893	0.3798	-2.7144	0.0815
LPOP	-2.4996	0.1237	-4.8295	0.0004

Source: EVIEWS-13 Program Outcomes

The results confirm that all variables become stationary at the first difference, indicating they are integrated of order one.

Cointegration Test Results (Table 2):

Test Statistic			Value			
F-statistic			5.689685			
Sample Size	10% I(0)	10% I(1)	5% I(0)	5% I(1)	1% I(0)	1% I(1)
35	2.254	3.388	2.685	3.960	3.713	5.326
40	2.218	3.314	2.618	3.863	3.505	5.121
Asymptotic	1.990	2.940	2.270	3.280	2.880	3.990

Source: EVIEWS-13 Program Outcomes

The test statistic (Fb) exceeds the critical value for the upper bound I(1), suggesting the presence of a long-run relationship among the variables.

Long-Run Estimates (Table 3):

Variable	Coefficient	Std. Error	T-statistic	Prob.	Significant
Lfm(-1)	0.004740	0.030245	0.156705	0.8766	Not significant
Lap(-1)	1.103457	0.079214	13.93000	0.0000	Significant (1%)
Ltex(-1)	0.213677	0.118209	1.807628	0.0810	Significant (10%)
Lgdpc(-1)	-0.420136	0.224224	-1.873738	0.0711	Significant (10%)
Lpop(-1)	-1.062490	0.264080	-4.023366	0.0004	Significant (1%)
Lexch(-1)	-0.044983	0.036288	-1.239628	0.2251	Not significant
C	-5.403966	3.000192	-1.801207	0.0821	Significant (10%)

Source: EVIEWS-13 Program Outcomes

The long-run estimation findings show that variations in food imports have no substantial impact on food security, implying that it may not be a major component in accounting for variances in food security levels. Furthermore, increased agricultural output has a strong beneficial impact on food security, emphasizing the need of increasing agricultural productivity in supporting long-term food security. While increased export levels may improve food security, statistical data is weak, suggesting that further research is needed to better understand the link between exports and food security. Furthermore, higher GDP per capita may be associated with worse levels of food security, maybe because economic expansion takes precedence over agricultural or social measures that promote food security. The study also indicates that growing population levels have a detrimental influence on food security, demonstrating the burden that population increase puts on food supplies. Then, the lack of a statistically significant effect suggests that exchange rates do not directly alter food security, Finally; the error correction term has a negative and statistically significant coefficient, indicating a force of adjustment from the short run towards long-run equilibrium.

Short-Run Estimates (Table 4):

Variable	Coefficient	Std. Error	t-Statistic	p-value	Significant
Cointeq*	-0.473394	0.059539	-7.951020	0.0000	Significant (1%)
D(lfm)	-0.008790	0.006264	-1.403176	0.1729	Not significant
D(lap)	0.999300	0.009523	104.9408	0.0000	Significant (1%)
D(lap(-1))	-0.052768	0.011108	-4.750354	0.0001	Significant (1%)
D(ltex)	0.047830	0.011872	4.028752	0.0005	Significant (1%)
D(lgdpc)	-0.100822	0.030896	-3.263254	0.0032	Significant (1%)
D(lgdpc(-1))	-0.031069	0.012911	-2.406422	0.0238	Significant (5%)
D(lpop)	-3.382027	1.277840	-2.646676	0.0139	Significant (5%)
D(lpop(-1))	7.793356	1.554198	5.014389	0.0000	Significant (1%)
D(lexch)	-0.045701	0.018686	-2.445748	0.0218	Significant (5%)

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D(lexch(-1))	-0.061075	0.014407	-4.239358	0.0003	Significant (1%)
Model Summary Statistics					
R-squared	0.999090		Log likelihood		141.6199
Adjusted R-squared	0.998726		Akaike info criterion		-7.256663
S.E. of regression	0.005682		Schwarz criterion		-6.772810
Sum squared resid	0.000807		Durbin-Watson stat		2.197903
F-statistic	2745.101		Prob(F-statistic)		0.000000

Source: EVIEWS-13 Program Outcomes

The estimates results reveal several significant relationships influencing food security in the Short-Run. Agricultural output has a substantial positive impact, highlighting its critical role in enhancing food security, while previous agricultural output shows a significant negative effect, potentially due to time lags in its influence. Additionally, the positive relationship with total exports underscores the importance of exports in improving food security. In contrast, higher GDP per capita correlates with reduced food security, indicating that economic growth may not necessarily lead to improved food access. The negative coefficients for population levels suggest that increases in population exert considerable pressure on food resources, while the positive lagged effect of population may indicate adjustments in resource allocation. Lastly, both current and lagged changes in exchange rates negatively impact food security, pointing to the need for effective policies to stabilize exchange rates and promote agricultural productivity to enhance food security in Algeria.

IV.2Diagnostic Tests:

To assess the statistical validity of the model, it is crucial to examine the properties of the random error term. Statistical tests for model adequacy focus on whether the error term satisfies key assumptions, such as normality, homoscedasticity (constant variance), and the absence of autocorrelation. Violations of these assumptions can lead to biased or inefficient estimates, affecting the accuracy and reliability of the model's predictions. Thus, we apply diagnostic tests, including tests for normality, heteroscedasticity, and autocorrelation, to ensure that the model's residuals meet the required statistical criteria. The following section presents the results of these validity tests, providing insight into the robustness of the model. This is achieved through the following tests:

Autocorrelation Test (Table 5):

F-statistic	0.431489	Prob. F(2,16)	0.6569
Obs*R-squared	1.842334	Prob. Chi-Square(2)	0.3981

Source: EVIEWS-13 Program Outcomes

The autocorrelation test results presented in Table 5 show that both the F-statistic (0.431489) with a p-value of 0.6569 and the Obs*R-squared (1.842334) with a p-value of 0.3981 indicate that we fail to reject the null hypothesis of no autocorrelation in the residuals. These p-values, both well above common significance levels, suggest that there is no statistically significant evidence of autocorrelation in the residuals. Consequently, the model's residuals appear to be free from autocorrelation, supporting the model's adequacy and reliability in terms of this assumption. This result enhances the robustness of the model, as the absence of autocorrelation.

Heteroskedasticity Test (Table 6):

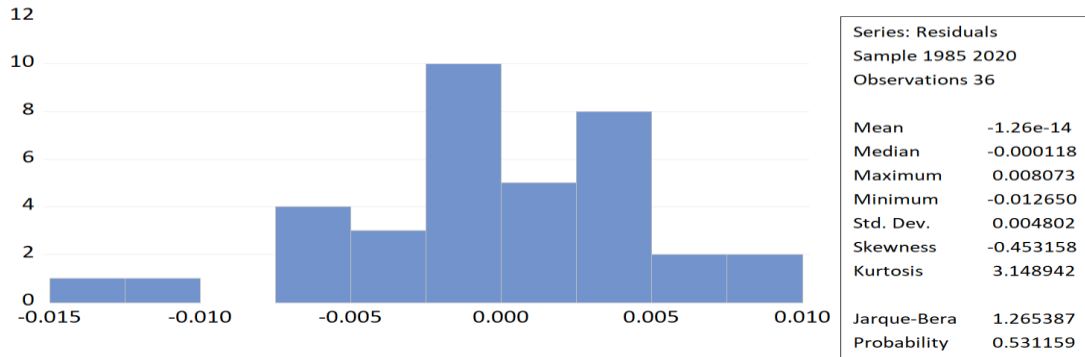
F-statistic	1.165970	Prob. F(17,18)	0.3740
Obs*R-squared	18.86688	Prob. Chi-Square(17)	0.3362
Scaled explained SS	5.067980	Prob. Chi-Square(17)	0.9976

Source: EVIEWS-13 Program Outcomes

The heteroskedasticity test results in Table 6 indicate that both the F-statistic (1.165970) with a p-value of 0.3740, the Obs*R-squared (18.86688) with a p-value of 0.3362 support acceptance of the null hypothesis of homoscedasticity. These p-values, all well above standard significance thresholds, suggest there is no statistically significant evidence of heteroskedasticity in the residuals. Thus, the residuals display constant variance, satisfying the homoscedasticity assumption.

This result strengthens the model’s validity, as homoscedastic residuals contribute to efficient and unbiased estimations, making the model more reliable for interpretation and prediction.

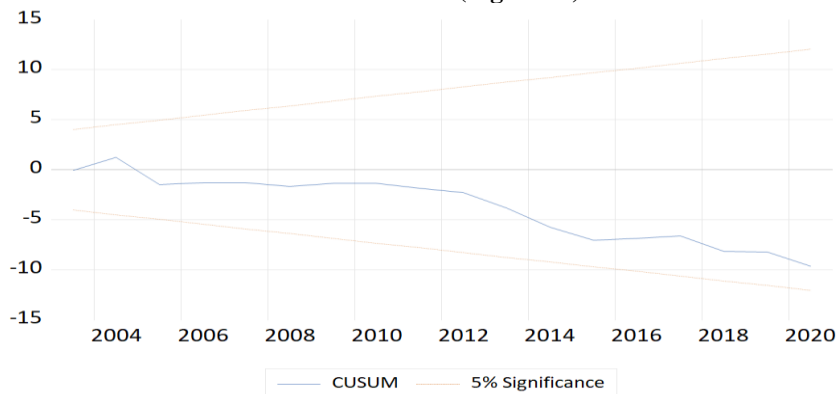
Normality Test (Figure 1):



Source: EVIEWS-13 Program Outcomes

The results of the normality test, as shown in the histogram and accompanying statistics, provide strong evidence that the residuals are normally distributed. Jarque-Bera Test: The Jarque-Bera statistic is 1.265387 with a p-value of 0.531159. This high p-value, above typical significance levels (such as 0.05), indicates that we fail to reject the null hypothesis of normality. Therefore, there is no significant deviation from normality in the residuals.

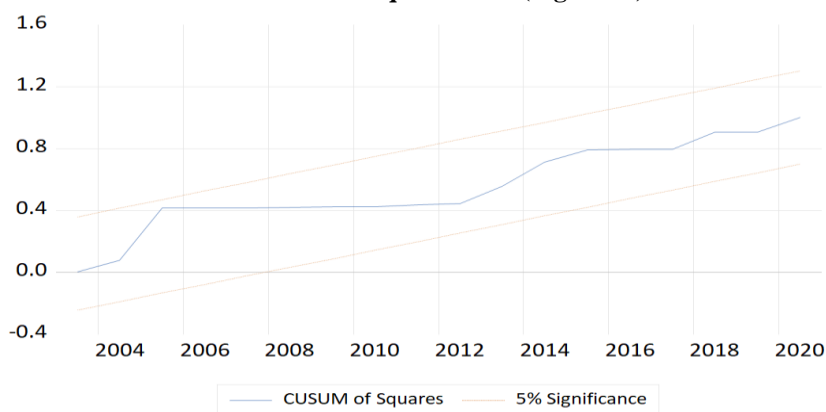
CUSUM Test (Figures 2):



Source: EVIEWS-13 Program Outcomes

Based on the results of these tests, the null hypothesis of model parameter stability is accepted as the curves fall within the 95% confidence interval.

CUSUM of Squares Test (Figures 3):



Source: EVIEWS-13 Program Outcomes

IV.3 discussion:

Despite Algeria has recorded a positive growth of gross agricultural production, food imports volume kept rising, even when we record growth rates in gross agricultural product, they are very low compared to growth rate of domestic demand, which causes food deficit that can be compensated through imports which have recorded a steady rise during all the study period, that shows the shortfall facing agricultural sector despite the amounts of money spent for its development. This can be explained by insufficient efficiency of agricultural policies, inefficiency of national food production to go along with rising demand, this is fundamentally due to non flexibility of production apparatus in the way that responds to growing domestic food demand, since Algeria has great potentials of agricultural resources, but exploiting these potentials I far from required level due to important delay seen by the promotion of agricultural sector. This leads to increasing imports to fill the gap between domestic offer and demand for food .Algeria is a market for food commodities from other countries, because production growth rates do not match consumption growth rates.

V- Conclusion:

Food security matter has become a necessary and inevitable requirement for all the countries, Algeria, like the rest of countries, made considerable efforts to achieve food security, but it remained a primarily importer country of foodstuff, that creates a food issue leading to increasing import costs year after year to a frightening extent, that makes it in heavy dependence which undermines its food security, sovereignty and independence.

Domestically produced foodstuff remains not enough to meet domestic demand, then there is big reliance on national income to cover the deficit, this creates risk since this income relies on unstable hydrocarbon prices, considering important position of these foodstuffs.

This makes Algeria in an explicit dependence on global market and subject to natural, political or social changes in high production countries.

The study concludes that food imports have a significant impact on food security levels in Algeria. The findings suggest that policies aimed at boosting domestic agricultural production and exports can contribute to enhancing food security in both the short and long run. Additionally, managing population growth and maintaining a stable exchange rate are crucial for ensuring long-term food security.

From the aforesaid, emerges the direct relation between food imports and food security in Algeria and that confirms the hypothesis of the study is correct.

Recommendations

Consolidate self-reliance and self-sufficiency of fundamental food commodities, necessity to reduce food dependence on food global market, non-achievement of self-sufficiency is considered a way for exporting countries to impose its agenda on food importing countries;

- Necessity to adopt an efficient development strategy to reduce food imports;
- Boost interest into agricultural research and provide necessary funding to develop and support centers of agricultural research;
- Reconsidering and giving great importance to agricultural investment and seeing to provide a stable economic and political environment that encourages and contributes in reducing food dependence;
- Following international successful experiments in agricultural investment. As an example, the Turkish Government worked on boosting the productivity of investing in agricultural sector, by

encouraging local and foreign investors through direct and indirect financial and material incentives, which resulted in achieving highly positive economic outcomes which contributed to achieve its food security (Zouaoui & Gherdi, 2023, p 106).

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How to cite this article by the APA method:

Yacef Hassiba, Djouadi Issam(2024), **Increase of Food Imports and its Impact on Food Security In Algeria During the period (1983 – 2020)**, *Economic Development Review*, Volume 09 (Number 03), Algeria: University of Eloued, pp. 274-288



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