

The impact of trade openness on the general equilibrium in the Algerian economy (1990-2020)

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Abstract:

This study aims to formulate econometric models to determine the impact of trade openness on the general equilibrium in the Algerian economy using the (I.S-L.M-P.B) model. It became evident that a state of equilibrium can be achieved at low levels of output, interest rates, and the price index (inflation). For instance, the equilibrium output represents 88.11% of the (G.D.P) for the year 2022. The equilibrium interest rate represents (-37.5%) of the interest rate for the year 2022, which was 8%. Additionally, the equilibrium price level represents (-1.18%) of the actual price index for the year 2022. In addition, in order to boost the Gross National Product to its actual value, an expansionary fiscal policy should be adopted through increasing government spending, as it is an effective policy to achieve the general economic equilibrium and reach an interest rate capable of encouraging investment.

Keywords: Trade openness; General equilibrium model; Algeria's economy;

Jel Classification Codes : F410; E010; C010

ملخص:

استهدفت الدراسة تحديد إمكانية توازن الاقتصاد الجزائري خلال فترة الإنفتاح التجاري، فأتضح أن التوازن محقق إذا كان الناتج منخفض وكذلك سعر الفائدة والتغير السعري من فترة لأخرى (التضخم). فمثل ناتج التوازن 88.11% من الناتج المحلي الإجمالي لسنة 2022؛ أما الفائدة التوازني يمثل -37.5% من سعر الفائدة لسنة 2022 والذي بلغ 8%، كما أن مستوى الأسعار التوازني نسبة -1.18% من الرقم القياسي الفعلي لسنة 2022. وللدفع بالناتج الوطني الإجمالي إلى قيمته الفعلية يجب زيادة الإنفاق الحكومي كونه سياسة فعالة من شأنها تحقيق التوازن الاقتصادي الكلي والوصول إلى فائدة تحفز الاستثمار.

الكلمات المفتاحية : انفتاح تجاري ؛ نموذج التوازن العام؛ اقتصاد الجزائر؛

تصنيف JEL : F410; E010; C010

I. Introduction:

In Algeria, to keep pace with the global trade openness movement and in response to the contradictions of the centrally planned model previously followed in Algeria, the Algerian authorities took steps and adopted programs to liberalize foreign trade, starting with the Supplementary Finance Law of 1990. Moreover, in view of the structural changes that followed trade openness policies, there were multiple repercussions on the general equilibrium- of the Alg-economy. And to accurately determine this pattern, we rely on econ- models, particularly the (I.S-L.M-B.P) model, to understand the true picture of this equilibrium.

The economic model is a simplified representation of the relationship between various econ- phenomena aimed at illustrating the extent of interdependence and mutual influence among them. The digital revolution and the advancements in database and software technologies have expanded the use of econ- measurement, including general equilibrium- models. These models provide a comprehensive analytical framework relied upon by decision-makers in various countries and international econ- institutions to evaluate economic policies and reform programs implemented by these countries. They also encompass tax reform issues, in addition to sustainable development, balanced econ- growth, equitable income distribution, and support in all its forms.

The study aims to investigate the reality of trade openness in the Alg- economy and analyze its implications on the general economic equilibrium- using the (I.S-L.M-B.P) model. The problem statement of the study is as follows: **Have trade openness policies contributed to achieving the general equilibrium in the Algerian economy during the period 1990-2020.**

I.1. The importance of the study:

The importance of the study is highlighted by the position of commercial openness within Algeria's macroeconomic system, as well as by the importance of public balance models in building macroeconomic policies and their impact on decision-making. We seek a set of explanatory results that will help to provide guidance to economic decision makers and development partners.

I.2. Objectives of the study:

The objectives of the study are:

- estimate and determine the balance in the market for goods and services;
- Estimate and determine balance in the money market;
- Estimate and determine balance of payments.
- Measuring Algeria's economic balance through the IS-LM-BP model.

I.3. Previous studies:

Studies on the subject include Malin Adolfson, Jespre Lindi, Mattias Villani: 2007), entitled Forecasting Performance of an Open Economy DSGE Model, aimed at analysing the prediction performance of the dynamic indiscriminate public equilibrium model of the euro area's estimated open economy (Bayesian) for the period from the first quarter of 1994 to the fourth quarter of 2002.

The study of Abdelbari Ayad and Ismail bin Qana (2019); Entitled Building a holistic model for measuring and analysing the overall balance in developing countries' economies through the Mundell-Fleming model for 1990-2018. The study aimed at building a standard model that would serve as a tool for formulating appropriate economic policies to achieve overall balance in the three markets (Goods and Services Market, Money Market and Balance of Payments). Drawing on dynamic overall balance models DSEG for a sample of four oil exporting countries, The study

demonstrated the effectiveness of Mundell-Fleming's model of economic policymaking in order to achieve a theoretical balance. However, the reality varies greatly, given the great interdependence between economic variables and their flows in developing countries. In addition to the effectiveness of fiscal and monetary policy in responding to crises and shocks and even modifying the imbalance in the balance of payments.

On the other hand, the study of Saif Radi Muhhi Nasser and others (2022) entitled Application of the Overall Balance Model (DSGE-Smets and wouters). to monetary policy in Iraq's economy for the duration (2004-2020), in which it sought the channels by which the impact of monetary policy would move to macroeconomic Iraq using a dynamic random general balance model. showed that the effectiveness of the monetary policy effect of Iraq's macroeconomic variables was very restricted by the disconnect between monetary behaviour and macroeconomic variables, and the analysis by means of (DSGE). demonstrated the Iraqi monetary authority's success in conveying its effects on nominal variables without the truth. Although there have been studies on the subject, we are trying to achieve the goal under an important period of trade openness in Algeria's economy.

II. THEORETICAL FRAMEWORK:

The subject of the study was addressed by many researchers Studies on the subject include (Maliin A., 2006) entitled Forecasting Performance of an Open Economy (D.S.G.E) Model. Which aimed to analyze the forecasting performance of a dynamic stochastic general equilibrium (D.S.G.E) model. for an open economy estimated using the Bayesian approach for the Euro area. From the first quarter of 1994 to the fourth quarter of 2002. The results demonstrated the importance of (D.S.G.E) models in policymaking for open economies.

As for the study by Abdelbari Ayad and Ismail Ben Kana (Abdelbari Ayad, 2019) aimed to develop a comprehensive model to analyze general equilibrium in developing economies, specifically using the Mundell-Fleming (M.F) framework for the period from 1990 to 2018. The authors focused on four oil-exporting countries and employed dynamic stochastic general equilibrium (D.S.G.E) models to assess the interplay between the goods and services market, the money market, and the balance of payments some key findings include:

- ✓ Model Effectiveness: The M.F model proved effective in theoretical policy formulation for achieving equilibrium across the examined markets.
- ✓ Real-World Challenges: Despite its theoretical strengths, the study highlighted significant discrepancies in practice. The strong interdependence of economic variables and inherent uncertainties in developing countries pose challenges to achieving equilibrium.
- ✓ Policy Implications: The effectiveness of fiscal and monetary policies in these countries is crucial for managing crises, responding to economic shocks, and correcting imbalances, particularly in the balance of payments.

On the other hand, The study by Saif Radi Muhhi Nasser et al. (2022) (Saif Radi Mahi Al-Din, 2022, p. 135) focused on the application of the Dynamic Stochastic General Equilibrium (D.S.G.E) model, specifically the Smets and Wouters framework, to analyze monetary policy's impact on the Iraqi economy from 2004 to 2020, we find :

- ✓ Monetary Policy Channels: The research aimed to identify how monetary policy influences macroeconomic variables in Iraq.

- ✓ **Transmission Inefficiency:** The study revealed that the effectiveness of monetary policy transmission is significantly limited. This inefficiency stems from a disconnect between monetary behavior and the actual performance of macroeconomic variables.
- ✓ **Impact on Variables:** While the Iraqi monetary authority successfully affected nominal variables (such as inflation and interest rates), the transmission to real economic variables (like output and employment) was less successful.

The study concludes that improving the link between monetary policy actions and real economic outcomes is crucial for enhancing the effectiveness of monetary policy in Iraq.

Despite the existence of studies that have addressed the subject, we are trying to achieve the goal in light of an important period that the Alg- economy has gone through, represented by trade openness.

II .1 Economic openness and practices of liberalizing foreign trade in Algeria:

At a time when state intervention in the economy grew to embody the state's responsibility for social welfare and fair wealth distribution, the promotion of Keynesian ideas began to emerge as a solution. By the late 1970s, signs of slow growth and economic recession became evident globally, leading to concerns about slow growth, sluggish private investment and savings, high inflation, balance of payments deficits, heavy debt burdens, and unemployment resulting from excessive growth of the public sector **(Muhammad, 1998, p. 50)**. This situation put Keynesianism in a dilemma, both in terms of ideology and economic policies. Ideologically, the emergence of stagflation in the late 1970s was attributed to government intervention in economic activity, which is at the core of Keynesianism. This led the new liberals to advocate for economic freedom and policies aimed at limiting the role of the state and its intervention in economic activity to combat stagflation. On the other hand, capitalism was able to harness creativity in the service of humanity, by respecting and encouraging innovation, which explains the difference between the socialist and capitalist systems **(Palmer, 2011, p. 23)**

Moving towards a competitive market economy forces countries in transition to implement a program aimed at profound changes in the political institutions and regulatory frameworks of their economies. This includes openness to the outside world, which allows for attracting investment to the national economy by reducing taxes and tariffs and removing all barriers that restrict dealings with foreign entities.

Given that the foreign trade sector is a sensitive sector, the government tended to monopolize this sector for nearly three decades (1963-1989). Where three aspects emerged at the national economic level, represented by scarcity, dependence (food and technology), and the expansion of parallel economic activities (smuggling, fraud, and tax evasion) **(bouchenafa, 2023, p. 217)**, Due to these aspects reflecting the troubled internal situation of the national economy, compounded by globalization creeping in at all levels, it was necessary to reorganize foreign trade through the following measures

- In the early 1990s, central allocation of foreign exchange was abolished, relying on supply and demand mechanisms to determine interest rates and exchange rates. The range of goods whose prices were set by the state was reduced, and the private sector was allowed to freely engage in foreign trade operations.
- The establishment of the system of authorized agents and wholesale traders and Articles 40

and 41 of the Supplementary Finance Law for the year 1990. This system allowed for the accreditation of authorized agents and wholesale traders.

- Upon the implementation of the Structural Adjustment Program (1994-1995), customs tariffs were reduced to a maximum of 30% through the total tariff reform of 2002.
- Issuing Order 03-04, which established the principle of freedom of trade operations for all natural and legal persons engaged in economic activities on a regular basis. This legislation maintained exceptions to freedom of import and export, as well as other exceptions related to means of protecting national production from practices such as dumping and subsidies, which are in full conformity with the rules of the World Trade Organization in this regard.
- Reducing the exchange rate to increase external demand for domestic goods and services.
- Establishing institutional frameworks to promote non-oil exports, providing support and assistance to export sectors, and overseeing the government's policy in diversifying exports. This includes the establishment of the Algerian Chamber of Commerce and Industry (C.A.C.I), the Algerian Company for Markets and Exhibitions (S.A.F.E.X), the National Agency for the Promotion of Foreign Trade, the Algerian Export Credit and Insurance Company, and the National Advisory Council for Export Promotion.
- Modernizing customs administration by updating its operational mechanisms to align with international economic transformations and facilitating customs procedures for entities operating in the export sector.

In order to determine the openness of the Algerian economy, we depend on the ratio of foreign trade to GDP, which was between 33.92% and 69.65%. This means that the Algerian economy is open to the world economy (bouchenafa, 2023, p. 215)

II.2 General economic equilibriums and general equilibrium models:

II.2.1 Equilibrium in the market for goods and services:

The (I.S) curve gives all combinations of income and interest rates that achieve equilibrium in the market for goods and services:

$$Y = C(Y - T) + I(r) + G(Y) + X(e) - M(Y, e)$$

II.2.2 The equilibrium in the money market:

In the money market, equilibrium occurs when the demand for money (M.D) matches the supply of money (M.S). The demand for money is influenced by three primary motives:

- ✓ Transactions Motive: This reflects the need for money to facilitate everyday transactions.
- ✓ Precautionary Motive: This involves holding money for unforeseen expenses or emergencies.
- ✓ Speculative Motive: This relates to the desire to hold money in anticipation of changes in interest rates or asset prices.

The demand for money is generally a function of the interest rate and overall income levels. On the other hand, the supply of money is determined by the monetary authority, which sets it according to the country's economic policy. Equilibrium is achieved when M.D equals M.S, ensuring that the amount of money people wish to hold aligns with what is available in the economy.

The equilibrium in the money market, represented by the L.M curve (Liquidity-Money), illustrates the various combinations of income (Y) and interest rates (i) where the demand for money equals the supply of money (**Achour, 2020, p. 04**):

$$\frac{(M.s)}{P} = (M.D)(Y, i)$$

II.2.3 Balance of Payments Equilibrium:

The equilibrium in the balance of payments reflects the relationship between total income and interest rates in the foreign market, balancing two key components:

- ✓ Current Account Balance (B.C): This includes all transactions related to the trade of goods and services, income from abroad, and current transfers. It measures the flow of goods and services in and out of a country.
- ✓ Balance of Capital Flows (B.K): This encompasses financial transactions, including investments, loans, and other capital transfers. It indicates how capital moves into and out of the country,

according to the following relationship:

$$(B.P) = (B.C)(e \times Pf/P, y, yf) + B.k(r - rf, k)$$

This equation means that for every level of income and corresponding level of I-mports, there is a level of interest rate sufficient to allow for the flow of balances to compensate for the deficit between exports and imports. This combination ensures the achievement of equilibrium in the balance of payments, known as the (B.P curve), which has a positive curve.

II.2.4 Equilibrium in (M.F) model:

This model is an extension of the simple K-eynesian model or what has been termed the developed K-eynesian model, which has been expanded to include the open economy with the presence of capital movements. The equilibrium in the (M.F) model occurs when the three curves (I.S, L.M, B.P) intersect. At this equilibrium point, the equilibrium in the goods and S-ervices market, M-oney market, and balance of payments is achieved, providing us with equilibrium income and interest rates, as well as the general equilibrium. However, there can be internal imbalances that prevent this equilibrium from being achieved, such as a decrease in economic growth, an increase in unemployment, inflation, etc. In such cases, the equilibrium point shifts to a new equilibrium that is economically better than the previous one. This is achieved by employing fiscal and monetary policy tools along with exchange rate systems and the degree of openness of the economy to the external world, considering the characteristics of capital movements. And what distinguishes this model is its suitability for countries experiencing some form of economic isolation (**Abdelbari Ayad, 2019, p. 19**).

III. Methods and Materials:

In this study, we will estimate and analyze the fundamental equations comprising the (I.S-L.M-B.P) model. Subsequently, we will measure the general equilibrium of the Alg-Economy, and mathematical functions will be estimated using the ordinary least squares method.

$$Y_t = \alpha_0 + \alpha_1 X_{1t} + \alpha_2 X_{2t} + \alpha_3 X_{3t} + \dots + \alpha_k X_{1k} + \varepsilon_t$$

Where: Y_t : Dependent variable, $X_{1t}, X_{2t}, \dots, X_{3t}$ interpreted variables.

$(\alpha_0, \alpha_1, \alpha_2, \dots, \alpha_k)$: Model coefficient.

We will estimate and analyze the functions specific to the study model. The functions represent the -equilibrium in the market for goods and services (I.S curve), are the following:

- Consumption-function.
- Investment-function.
- Government-expenditure function.
- Exports-function.
- Imports-function.

Additionally, we will analyze that represents the -equilibrium in the money market, the (L.M curve), as well as the function that represents the -equilibrium in the balance of payments.

IV. Results and discussion:

IV.1. Analysis and Estimation of the Household-Consumption:

$$C = 945767.8 + 0.21 Y$$

The household-consumption function illustrates the relationship between consumption expenditure (C) and gross-domestic product (Y). Specifically, when G.D.P increases by one unit, consumption-expenditure increases by 0.21 units.

Statistically, the results of the estimated equation indicate that all features are statistically significant. Additionally, the model has a high-explanatory power of 95%.

IV.2 . Analysis and Estimation of the Investment Expenditure:

$$I = 9670948 - 560802.5 r$$

The investment-expenditure function indicates an inverse relationship between investment (I) and the interest-rate (r). And it aligns with economic theory, suggesting that an increase in the interest-rate by one unit leads to a decrease in investment by 560802.5 units. Moreover, the model is significant as a whole and statistically acceptable.

IV.3. Analysis and Estimation of Government Expenditure:

$$G = -277629.1 + 0.404355 Y$$

The government-expenditure function indicates that changes in income lead to changes in government-expenditure in the same direction, with a value of 0.404355 units. Additionally, the estimation results suggest that the model is statistically acceptable, with a high explanatory power (98%).

IV.4. Analysis and Estimation of E-xport:

$$X = 481580.4 + 0.245443 Y$$

The statistical interpretation of the results indicates that a one-unit change in gross-domestic product leads to a change in Algerian-exports by 0.24 units, which aligns with economic theory. Additionally, the model is statistically acceptable due to the significance of the estimated features.

Despite its comparatively lower explanatory power (78%) compared to previous models, it is still deemed acceptable.

IV.5. Analysis and Estimation of I-mport:

$$M = -475641.3 + 0.326072 Y$$

Statistically, the import-function model is acceptable (significant features, good explanatory power). Economically, it indicates that a one-unit change in gross domestic-product leads to a change in Algerian imports by 0.32 units.

IV.6. Analysis and Estimation of M.oney Demand:

$$(M.d) = 593.621 + 0.000582 Y - 61.40123 r$$

The estimation results indicate the overall significance of the model, and that both the gross-domestic product and the interest rate explain 97% of the changes that occur in the level of demand for money in Algeria during the study period. Economically, the inverse relationship between money-demand and interest-rate constitutes the essence of economic-theory. A one-unit increase in interest rates leads to a decrease in money demand by 61.04 units, while an increase in income leads to an increase in money demand by 0.00058 units.

IV.7. Analysis and Estimation of Balance of Payments Equilbrum:

$$(B.P) = 5220.03 + 0.000517 Y + 51.5165 r - 83.223 P$$

The Alg- balance of payments has been characterized by imbalance during most periods of the study (as indicated in the appendix). The estimation results indicate that an increase in gross-domestic product (G.D.P) by one unit leads to a surplus in the balance of payments of 0.00015 units, which is a weak ratio for the Alg- economy. Additionally, the function indicates that an increase in the interest-rate by one unit leads to a surplus in the balance of payments of 51.51 units, aligning with economic-theory where an increase in the interest-rate attracts capital inflows, thereby resulting in a surplus in capital that works to correct the deficit in the balance of payments.

On the other hand, an increase in the general-level of prices by one unit leads to a deficit in the balance of payments of 83.23 units (with other factors remaining constant). The rise in prices in Algeria, in addition to the weak production-capacity out-side fuel, did not encourage an increase in Algerian-exports, which created a deficit in the balance of payments.

IV.8. General equilibrium in the Algerian economy:

IV.8.1. Equilibrium in the market for goods and services:

The equation of -equilibr in the commodity market can be determined as follows:

$$Y = C + I + G + X - M$$

Since the functions of consumption (C), investment (I), government expenditure (G), exports (X), and imports (M) are as follows

$$C = 945767.8 + 0.210629 Y \dots \dots \dots (1)$$

$$I = 9670948 - 560802.5 r \dots \dots \dots (2)$$

$$G = -277629.1 + 0.404355 Y \dots \dots \dots (3)$$

$$X = 481580.4 + 0.245443 Y \dots \dots \dots (4)$$

$$M = -475641.3 + 0.326072 Y \dots \dots \dots (5)$$

The following is obtained:

$$Y - 0.534355Y = 11296308.4 - 560802.5 r \dots \dots \dots (6)$$

To determine the -equilibr income achieved during the study period, we will use the interest rate for the year 2022 and substitute it into equation (6). Thus, we find:

$$Y^* = \frac{1}{1 - 0.534555} [11296308.4 - 560802.5(0.08)]$$

$$Y^* = 24163136.9$$

It is worth noting that the -equilibr income, which amounted to 24,163.1369 billion DZD during the study period, is very close to the income achieved in 2022, which amounted to 27,688.9 DZD.

IV.8.2. Money Market Equilibrium:

Equilibrium- in the money market is achieved when the demand for money (Md) equals the money supply (Ms). The demand for money function in the Algerian economy for the period 1990-2020 can be expressed as follows:

$$Md = 593.621 + 0.000582 Y - 61.40123 r \dots \dots \dots (07)$$

In order to measure the money supply needed to achieve the -equilibr of the total expenditure for the year 2022 based on the interest rate and the gross domestic product (G.D.P) for the year 2022, we substitute the values of the -equilibr income and the interest-rate for 2022 into the money demand function as follows:

$$Md = 593.621 + 0.000582 (23939243) - 61.40123$$

$$Md = 14521.34$$

When comparing this number with the money supply during July 2022, we find it almost equal to it, as it reached 14,811.7 billion Alg- dzd during this period.

IV.8.3. The balance of payments -equilibrium:

The balance of payments equilibrium for the Alg- economy can be diagnosed through the following function:

$$BP = 5220.03 + 0.000517 Y + 51.5165 r - 83.223 P \dots \dots \dots (08)$$

If the balance of payments for the Alg- economy has achieved a surplus of 262,274 billion DZD, then the equation representing the balance of payments -equilibrium for Algeria would be as follows:

$$262274 = 5220.03 + 0.000517 Y + 51.5165 r - 83.223 P$$

$$257053.97 = 0.000517 Y + 51.5165 r - 83.223 P \dots \dots (09)$$

IV.8.4. Measuring the level of Algerian economic equilibrium using the IS-LM-BP model:

Using the equilibrium function in the goods and Services Market (Equation 06). Which represents the IS curve, and Equation 07. which represents the equilibrium in the money market, corresponding to the LM curve after compensating for the money supply for the year 2022, amounting to 14,811.7 billion D.Z., as well as Equation 08, which represents the balance of payments equilibrium, representing the LM curve.

$$Y - 0.534355Y = 11296308.4 - 560802.5 r \dots \dots \dots (6)$$

$$14811.7 = 593.621 + 0.000582 Y - 61.40123 r \dots \dots \dots (07)$$

$$262274 = 5220.03 + 0.000517 Y + 51.5165 r - 83.223 P \dots \dots (08)$$

By solving these equations, we obtain the equilibrium values for national-income, interest-rate, and general-price level as follows:

$$Y = 24397477, \quad r = -0.3, \quad P = -2937.47$$

When comparing these results with what is achieved in 2022, we find that a state of equilibrium in the Alg- economy can be achieved, but at low levels of output, low interest-rates, and a low price level (inflation-rate). The equilibrium output represented 88.11% of the G.D.P for the year 2022, the interest-rate represented -37.5% of the interest-rate for the same year, which was 8%, and the price index represented (-1.18%) of the actual index for the year 2022, which amounted to 247.2%.

IV.8.5. Economic Alternatives to Achieve General -Equilibrium in the Algerian Economy

The (IS – LM – B.P) curves intersect at low levels of G.D.P and negative interest rates. To address this situation and make the curves intersect at a higher level of G.D.P and a positive interest-rate to encourage investment, an expansionary fiscal policy is necessary. This can be achieved through an increase in government-spending. When government-spending increases by 5.36% (370,369.6) compared to its level in 2020, the following results are obtained:

$$Y - 0.534355Y = 11296308.4 - 560802.5 r + 370369.6$$

$$14811.7 = 593.621 + 0.000582 Y - 61.40123 r$$

$$262274 = 5220.03 + 0.000517 Y + 51.5165 r - 83.223 P$$

By solving these equations, we obtain the equilibrium values for national income, interest rate, and the general price level as follows:

$$Y = 25037744, \quad r = 5.76, \quad P = -2929.73$$

From these results, we observe that the gross domestic product (GDP) has increased to represent 92.42% of the G.D.P achieved in 2022. Additionally, the interest-rate has risen to 5.76%.

Therefore, continuing the growth of government spending would contribute to achieving the general econ- equilibr in the Alg- economy.

V. Conclusion:

This study examined the formulation of standard models to determine the impact of trade openness on the general -equilibr in the Alg- economy using the (I.S / L.M / B.P) model. Various statistical tools were employed to achieve realistic results. Among the conclusions drawn:

- The results indicate that the features have statistical significance at a 10% level of significance. This suggests the validity of the first hypothesis, meaning that the ordinary least squares - method assists in building the standard models constituting the I. S / L . M / B . P model and in analyzing the general -equilibr characteristics of the Alg- economy.
- The value of the coefficient of determination and the corrected coefficient of determination are very strong in most of the estimated functions between the dependent -variable and the explanatory -variables, which reflects the -explanatory power of the model.
- The low marginal propensity of the consumption-function (0.21) is attributed to the use of gross-domestic product (G.D.P) data instead of disposable income data. This decrease in propensity indicates a reduction in total-consumption in the Alg- economy, suggesting that the household sector contributes less significantly to G.D.P, undermining future economic-growth opportunities in Algeria.
- The investment-function aligns with economic theory, as there is an inverse relationship between investment and interest-rates. Additionally, the sensitivity of investment to interest-rates is significant, as a one-unit change in interest-rates leads to a change in investment of 56,082.5 billion Alg- dzd.
- The high marginal propensity of the Alg-imports function, reaching 0.32, reflects the inability of the Alg- economy to satisfy domestic-demand, indicating leakage from the national income cycle towards foreign-markets.
- The inverse relationship between demand for money and interest-rates is at the core of economic theory. A one-unit increase in interest-rates leads to a decrease in demand for money by 61.04 units, while an increase in income leads to an increase in (M.d) by 0.00058 units.
- An increase in the general-price level by one unit leads to a deficit in the ba.lance of payments by 83.23 units (holding other factors constant). The price increase in Algeria, coupled with the lack of production capacity outside of fuel, has not encouraged an increase in Alg-exports, resulting in a deficit in the balance of payments.
- The -equilibr in Algeria's economy can be achieved; But at low levels of output, low interest-rate and price index (inflation).
- The -equilibr output represents 88.11% of the Gross-Domestic-Product for the year 2022.
- The -equilibr interest rate reached a value of (-0.3), which is expected since the government bears the financing costs of most investment projects, especially in the agricultural sector. The -equilibr interest rate represents (-37.5%) of the interest-rate for the year 2022, which reached (8%).
- The -equilibr price level represented a percentage of (-1.18%) of the actual index for the year 2022, which amounted to 247.2%.

- The I . S – L . M – B . P curves intersect at low levels of Gross-Domestic-Product and negative interest-rates, indicating the invalidity of the second hypothesis.

Based on the findings, especially with regard to the general -equilibr of the I.S-L.M-B.P model, we recommend the following:

- The necessity of drive the gross-national product to its actual value through coordination between real sector, monetary, and ba.lance of payments policies.
- The necessity to increase government-spending as an effective economic policy that can achieve general econ-equilibr and attain an interest-rate capable of encouraging investment.
- Efforts should be made to reduce the general-price level by decreasing the money-supply, as it is one of the causes of inflation, especially after the non-traditional financing policies adopted by the Alg- government following the decline in oil prices at the end of 2014, the effects of which are still present today.
- Enhance household-consumption in the Alg- economy by increasing the purchasing power of individuals and linking it to labor productivity.
- A clear scientific vision and formulation must be developed to overcome the obstacles to the investment climate, thereby improving its level and promotion, as well as benefiting from its advantages (Kheira, 2024, p. 18).
- The need to improve the national economy's attractiveness to external investment flows and to localize them to accelerate growth; Promoting the development and development of SMEs.
- Strengthening the role of monetary policy in Algeria's economy through the need to contain the informal economy, especially with regard to exchange rates.
- Diversify Algeria's economy and bring foreign investment through improving the investment environment, especially in mechanical industries and construction works, as well as promoting Algerian exports, especially in agricultural products.
- Eliminate duplication of economic structures and make the private sector an entrepreneur rather than a government sector.

Appendices:

Appendix (01): Statistical Data for the Study

Year s	r	Bp	M	X	Md	P	G	I	GDP	C
1990	18.4 1	752.43	86796	101284	343.006	21.16	136500	160217	554388.1	405200
1991	18.4 1	19341. 2	139257	219391	415.269	26.64	212100	26673390	862132.8	529000
1992	18.4 1	0.23	180141	232237	515.894	35.08	420131	319811.1	1074695.8	707700
1993	18.4 1	-0.01	205463	235928	627.426	42.28	476627	336203	1189724.9	838400
1994	18.4 1	-4.83	340137	302909	723.513	54.54	566329	467941.2	1487403.6	107270 0
1995	18.4 1	-6.32	513193	488270	799.561	70.79	759617	633031.4	2004994.7	120392 0
1996	19	-2.09	495885	732103	915.059	84.03	724609	644641.4	2570028.9	136836 0

1997	15.7 0	1.16	501582	801712	1081.522	88.82	845196	647459	2780168	153280 0
1998	11.5	-1.74	552359	599903	1592.462	93.26	875739	773955.4	2830490.7	169724 0
1999	10.7 5	-2.38	610527	834684	1789.354	95.68	961682	849951.4	3238197.5	186168 0
2000	10	7.57	690426	165851 5	2022.536	95.97	117812 2	971661.1	4123513.9	202612 0
2001	9.5	6.19	768086	148017 3	2473.5	100	132102 8	1134601. 9	4227113.9	219056 0
2002	8.58 3	3.66	957027	149993 3	2901.5	101.4 3	155064 6	1386382. 4	4522773.3	235500 0
2003	8.12 5	7.47	104751 4	190456 6	3299.5	105.7 5	163926 5	1593589	5252321.1	251944 0
2004	8	9.25	131915 8	231179 6	3,644.30	109.9 5	188893 0	2045414	6149116.7	268388 0
2005	8	16.94	149364 3	337456 4	4,070.40	111.4 7	205203 7	2393852. 9	7561984.3	284832 0
2006	8	17.74	155854 0	396700 5	4,827.60	114.0 5	245301 4	2564982. 7	8514843.3	301276 0
2007	8	29.55	191682 9	417273 0	5,994.60	118.2 4	310866 9	3223891. 4	9366565.9	317720 0
2008	8	36.99	257203 3	514267 0	6,955.90	123.9 8	419105 3	4124650. 6	11077139. 4	334164 0
2009	8	3.86	285480 5	328282 0	7,173.10	131.1	424633 4	4672657. 4	10006839. 7	350608 0
2010	8	15.33	301180 7	424474 6	8,280.70	136.2 3	446694 0	4968140	12034399	367052 0
2011	8	20.141	344250 2	535451 0	9,929.20	142.3 9	585356 9	5551841. 9	14481007. 8	383496 0
2012	8	12.057	390707 2	557278 6	11,015.1 0	155.0 5	705817 3	6347399. 5	16115429. 5	399940 0
2013	8	0.133	436854 8	515723 3	11,941.5 0	160.1	602413 1	7223631. 8	16569270. 8	416384 0
2014	8	-5.881	575100 0	512000 0	13,686.7 0	164.7 7	699576 9	7848390. 2	17228600	432828 0
2015	8	-27.537	593554 0	413983 0	13,704.5 0	172.6 5	765633 1	8486816. 6	18255500	449272 0
2016	8	-26.031	672362 0	407829 0	13,816.3 0	183.7	729749 4	8893534. 1	17082100	465716 0
2017	8	-21.762	622711 0	420802 0	14,974.6 0	193.9 7	728263 0	9163201. 3	18587600	482160 0
2018	8	-15.82	702794 0	486068 0	16,636.7 0	202.2 5	773207 0	9599326. 4	20509500	498604 0
2019	8	-16.93	597990 0	459230 0	16,506.6 0	206.2	774134 5	9162326. 4	20284000	515048 0
2020	8	-16.37	538170 0	298500 0	17,659.6 0	211.1 8	690288 7	7693962. 3	19473000	531492 0

Source: - National Bureau of Statistics. <https://www.ons.dz/spip.php?rubrique327>.

- World Bank database. <https://data.albankaldawli.org>

Appendix (02): Results of the Study's Function.Estimatation

Estimation of the investment-expenditure function	Results of estimating the consumption- expenditure function
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Dependent Variable: I Method: Least Squares Date: 03/07/24 Time: 09:12 Sample (adjusted): 6 31 Included observations: 26 after adjustments					Dependent Variable: C01 Method: Least Squares Date: 03/06/24 Time: 21:08 Sample: 1 31 Included observations: 31																																							
<table><tr><th>Variable</th><th>Coefficient</th><th>Std. Error</th><th>t-Statistic</th><th>Prob.</th></tr><tr><td>C</td><td>9670948.</td><td>1752334.</td><td>5.518896</td><td>0.0000</td></tr><tr><td>R</td><td>-560802.5</td><td>174807.8</td><td>-3.208110</td><td>0.0038</td></tr></table>					Variable	Coefficient	Std. Error	t-Statistic	Prob.	C	9670948.	1752334.	5.518896	0.0000	R	-560802.5	174807.8	-3.208110	0.0038	<table><tr><th>Variable</th><th>Coefficient</th><th>Std. Error</th><th>t-Statistic</th><th>Prob.</th></tr><tr><td>C</td><td>945767.8</td><td>97437.83</td><td>9.706372</td><td>0.0000</td></tr><tr><td>GDP</td><td>0.210629</td><td>0.008609</td><td>24.46609</td><td>0.0000</td></tr></table>					Variable	Coefficient	Std. Error	t-Statistic	Prob.	C	945767.8	97437.83	9.706372	0.0000	GDP	0.210629	0.008609	24.46609	0.0000					
Variable	Coefficient	Std. Error	t-Statistic	Prob.																																								
C	9670948.	1752334.	5.518896	0.0000																																								
R	-560802.5	174807.8	-3.208110	0.0038																																								
Variable	Coefficient	Std. Error	t-Statistic	Prob.																																								
C	945767.8	97437.83	9.706372	0.0000																																								
GDP	0.210629	0.008609	24.46609	0.0000																																								
R-squared 0.300128 Mean dependent var 4330742. Adjusted R-squared 0.270966 S.D. dependent var 3269834. S.E. of regression 2791897. Akaike info criterion 32.59614 Sum squared resid 1.87E+14 Schwarz criterion 32.69292 Log likelihood -421.7499 Hannan-Quinn criter. 32.62401 F-statistic 10.29197 Durbin-Watson stat 0.085732 Prob(F-statistic) 0.003766					R-squared 0.953791 Mean dependent var 2848320. Adjusted R-squared 0.952198 S.D. dependent var 1495145. S.E. of regression 326893.4 Akaike info criterion 28.29500 Sum squared resid 3.10E+12 Schwarz criterion 28.38751 Log likelihood -436.5724 Hannan-Quinn criter. 28.32515 F-statistic 598.5896 Durbin-Watson stat 0.319775 Prob(F-statistic) 0.000000																																							
Estimation of the Imports-function					Results of estimating the government expenditure-function																																							
Dependent Variable: M Method: Least Squares Date: 03/07/24 Time: 07:22 Sample (adjusted): 1 31 Included observations: 31 after adjustments					Dependent Variable: G Method: Least Squares Date: 03/06/24 Time: 22:27 Sample (adjusted): 1 31 Included observations: 31 after adjustments																																							
<table><tr><th>Variable</th><th>Coefficient</th><th>Std. Error</th><th>t-Statistic</th><th>Prob.</th></tr><tr><td>C</td><td>-475641.3</td><td>164874.2</td><td>-2.884874</td><td>0.0073</td></tr><tr><td>GDP</td><td>0.326072</td><td>0.014567</td><td>22.38391</td><td>0.0000</td></tr></table>					Variable	Coefficient	Std. Error	t-Statistic	Prob.	C	-475641.3	164874.2	-2.884874	0.0073	GDP	0.326072	0.014567	22.38391	0.0000	<table><tr><th>Variable</th><th>Coefficient</th><th>Std. Error</th><th>t-Statistic</th><th>Prob.</th></tr><tr><td>C</td><td>-277629.1</td><td>114884.0</td><td>-2.416603</td><td>0.0222</td></tr><tr><td>GDP</td><td>0.404355</td><td>0.010150</td><td>39.83625</td><td>0.0000</td></tr></table>					Variable	Coefficient	Std. Error	t-Statistic	Prob.	C	-277629.1	114884.0	-2.416603	0.0222	GDP	0.404355	0.010150	39.83625	0.0000					
Variable	Coefficient	Std. Error	t-Statistic	Prob.																																								
C	-475641.3	164874.2	-2.884874	0.0073																																								
GDP	0.326072	0.014567	22.38391	0.0000																																								
Variable	Coefficient	Std. Error	t-Statistic	Prob.																																								
C	-277629.1	114884.0	-2.416603	0.0222																																								
GDP	0.404355	0.010150	39.83625	0.0000																																								
R-squared 0.945287 Mean dependent var 2469682. Adjusted R-squared 0.943400 S.D. dependent var 2325009. S.E. of regression 553135.1 Akaike info criterion 29.34693 Sum squared resid 8.87E+12 Schwarz criterion 29.43945 Log likelihood -452.8775 Hannan-Quinn criter. 29.37709 F-statistic 501.0393 Durbin-Watson stat 0.676676 Prob(F-statistic) 0.000000					R-squared 0.982054 Mean dependent var 3374805. Adjusted R-squared 0.981435 S.D. dependent var 2828709. S.E. of regression 385423.4 Akaike info criterion 28.62441 Sum squared resid 4.31E+12 Schwarz criterion 28.71693 Log likelihood -441.6784 Hannan-Quinn criter. 28.65457 F-statistic 1586.927 Durbin-Watson stat 1.040068 Prob(F-statistic) 0.000000																																							
Estimation of the money demand-function					Results of estimating the exports-function																																							
Dependent Variable: MD Method: Least Squares Date: 03/07/24 Time: 07:46 Sample: 6 15 Included observations: 10					Dependent Variable: X Method: Least Squares Date: 03/07/24 Time: 07:31 Sample (adjusted): 1 31 Included observations: 31 after adjustments																																							
<table><tr><th>Variable</th><th>Coefficient</th><th>Std. Error</th><th>t-Statistic</th><th>Prob.</th></tr><tr><td>C</td><td>593.6210</td><td>657.3793</td><td>0.903011</td><td>0.3985</td></tr><tr><td>GDP</td><td>0.000582</td><td>9.08E-05</td><td>6.405426</td><td>0.0004</td></tr><tr><td>R</td><td>-81.40123</td><td>28.34185</td><td>-2.168451</td><td>0.0670</td></tr></table>					Variable	Coefficient	Std. Error	t-Statistic	Prob.	C	593.6210	657.3793	0.903011	0.3985	GDP	0.000582	9.08E-05	6.405426	0.0004	R	-81.40123	28.34185	-2.168451	0.0670	<table><tr><th>Variable</th><th>Coefficient</th><th>Std. Error</th><th>t-Statistic</th><th>Prob.</th></tr><tr><td>C</td><td>481580.4</td><td>269482.5</td><td>1.787056</td><td>0.0844</td></tr><tr><td>GDP</td><td>0.245443</td><td>0.023810</td><td>10.30847</td><td>0.0000</td></tr></table>					Variable	Coefficient	Std. Error	t-Statistic	Prob.	C	481580.4	269482.5	1.787056	0.0844	GDP	0.245443	0.023810	10.30847	0.0000
Variable	Coefficient	Std. Error	t-Statistic	Prob.																																								
C	593.6210	657.3793	0.903011	0.3985																																								
GDP	0.000582	9.08E-05	6.405426	0.0004																																								
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Variable	Coefficient	Std. Error	t-Statistic	Prob.																																								
C	481580.4	269482.5	1.787056	0.0844																																								
GDP	0.245443	0.023810	10.30847	0.0000																																								
R-squared 0.972209 Mean dependent var 2051.929 Adjusted R-squared 0.964269 S.D. dependent var 1004.162 S.E. of regression 189.8134 Akaike info criterion 13.57329 Sum squared resid 252203.9 Schwarz criterion 13.66406 Log likelihood -64.86643 Hannan-Quinn criter. 13.47370 F-statistic 122.4409 Durbin-Watson stat 1.695410 Prob(F-statistic) 0.000004					R-squared 0.785605 Mean dependent var 2698600. Adjusted R-squared 0.778213 S.D. dependent var 1919732. S.E. of regression 904084.9 Akaike info criterion 30.32957 Sum squared resid 2.37E+13 Schwarz criterion 30.42209 Log likelihood -468.1084 Hannan-Quinn criter. 30.35973 F-statistic 106.2846 Durbin-Watson stat 0.362376 Prob(F-statistic) 0.000000																																							
Estimation of the balance of payments-function																																												
Dependent Variable: BP Method: Least Squares Date: 03/07/24 Time: 08:23 Sample (adjusted): 1 31 Included observations: 31 after adjustments																																												
<table><tr><th>Variable</th><th>Coefficient</th><th>Std. Error</th><th>t-Statistic</th><th>Prob.</th></tr><tr><td>C</td><td>5220.033</td><td>5059.670</td><td>1.031694</td><td>0.3114</td></tr><tr><td>GDP</td><td>0.000517</td><td>0.000298</td><td>1.732755</td><td>0.0945</td></tr><tr><td>R</td><td>51.51650</td><td>225.0679</td><td>0.228893</td><td>0.8207</td></tr><tr><td>P</td><td>-83.22300</td><td>44.24058</td><td>-1.881146</td><td>0.0708</td></tr></table>										Variable	Coefficient	Std. Error	t-Statistic	Prob.	C	5220.033	5059.670	1.031694	0.3114	GDP	0.000517	0.000298	1.732755	0.0945	R	51.51650	225.0679	0.228893	0.8207	P	-83.22300	44.24058	-1.881146	0.0708										
Variable	Coefficient	Std. Error	t-Statistic	Prob.																																								
C	5220.033	5059.670	1.031694	0.3114																																								
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R-squared 0.209282 Mean dependent var 649.4903 Adjusted R-squared 0.121425 S.D. dependent var 3471.685 S.E. of regression 3254.092 Akaike info criterion 19.13313 Sum squared resid 2.86E+08 Schwarz criterion 19.31816 Log likelihood -292.5635 Hannan-Quinn criter. 19.19344 F-statistic 2.382063 Durbin-Watson stat 2.511141 Prob(F-statistic) 0.091522																																												

Source: Prepared by the researchers.

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