

**THE IMPACT OF FOREIGN DIRECT
INVESTMENT ON ECONOMIC GROWTH IN
ALGERIA 1990-2022**

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Abstract : The aim of this study is to empirically investigate the impact of foreign direct investment (FDI) on the economic growth of Algeria during the era of globalization. This relationship has been extensively examined in existing literature. Our empirical analysis employs a VECM model approach using data spanning from 1990 to 2022, the results of this study provide important indications on the determinants of GDP in Algeria and highlight the importance of FDI, exchange rate and trade balance in promoting long-term economic growth.

Key words : FDI, economic growth , GDP, VECM MODEL

Jel Classification Codes :

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1. INTRODUCTION :

Economic growth is widely regarded as an important indicator of the economic health of each country. Economic policy aims to promote this expansion by intervening in all areas of the economy. The objective is to preserve sustainable levels of economic growth to improve the well-being of citizens. Dynamic growth promotes job creation, reduction of the unemployment rate and also the encouragement of investment and production.

Talking about strategic ways that encourage the development of countries will lead us to focus on foreign direct investment (FDI), which is one of the driving forces behind the globalization of the economy, thanks to its importance in the supply of capital technology as well as the attractiveness of new markets.

On the other hand, the benefits that FDI brings to the economies of host countries, particularly those of development is the reason why many governments have introduced measures to encourage foreign direct investment.

Algeria is one of countries which hope to develop their economics situation ;implement these investments in order to strengthen it. Progress testifies to the difficulties and changes that many

developing countries have faced over time. Unfortunately, this great dependence has created vulnerabilities for Algeria following the economic crisis of the 1990s, which triggered a reassessment of existing economic policies, from which the authorities and experts then introduced structural reforms aimed at reforming and diversifying the country's economy. First, it was the removal of restrictions on investment and the opening of the economy to private actors, including foreign investors. Its goal is to position foreign direct investment (FDI) as a driver of economic growth, promote knowledge and technology transfer, and increase competitiveness in global markets. Reforms also include removing barriers to investment and encouraging the participation of the private sector, including foreign investors. This approach aims to promote foreign direct investment as a lever for economic growth, facilitate the sharing of knowledge and technology, and improve competitiveness in global markets.

The bilateral orientation and correlation between FDI and economic growth GDP have been established by several research studies.

this paper will intend to analyze the effects of Foreign Direct Investment (FDI) on economic growth, even though the period examined was characterized by periods of economic instability including economic reforms, debt restructuring, economic

reorganization, political instability and finally the Covid-19 pandemic.

The question of the study:

The question of the study try to investigate the influence of foreign direct investment (FDI) on economic growth in Algeria over the period from 1990 to 2022. This inquiry delves into the relationship between FDI inflows and various macroeconomic indicators of economic growth, such as GDP growth rates, the study aims to provide insights into the extent to which FDI has contributed to or hindered economic development in the country.

So What is the influence of FDI on economic growth in Algeria during the period 1990-2022?

Hypothesis:

There is an impact of foreign direct investment on economic growth in Algeria.

The Objectif of the study:

This study aims to test the influence of foreign direct investment on economic growth in Algeria through the use of standard economic methods.

The importance of the study:

Understanding the dynamics of foreign direct investment (FDI) in Algeria holds paramount importance for the nation's economic

trajectory. Firstly, FDI serves as a catalyst for economic development by fostering growth, generating employment opportunities, and bolstering infrastructure. Secondly, it plays a pivotal role in diversifying the Algerian economy away from its heavy reliance on oil and gas revenues, thereby mitigating vulnerability to volatile commodity prices. Additionally, FDI facilitates Algeria's integration into the global economy, enabling access to new markets, technologies, and management practices. Moreover, analyzing FDI trends informs policy formulation to enhance the investment climate, reduce barriers, and promote transparency. Ultimately, understanding FDI is crucial for identifying Algeria's competitive advantages and areas needing improvement, thus guiding strategic decisions for sustainable economic growth

Methodology:

we employed a descriptive and analytical methodology In this study, , in addition to the standard approach, to determine the extent of the impact of variables under study on economic growth in Algeria, utilizing the **RSTUDIO** software.

In this situation, our goal is to find a way to rethink the following question:

- To get back to our problem we base on the **VECM empirical method** In order to better Understanding our purpose, this paper is structured as follows:

In the first part, we will briefly address the economic literature on the conceptual framework of economic growth and foreign direct investment.

A second part examines the evolution of Ides in Algeria in the period 1990-2022

Finally, a study allows the modelling of variables by the empirical VECM method of data, followed by an interpretation of data

2.THEORY AND ASSOCIATED LITERATURE :

The economic literature contains a vast array of studies examining the influence of foreign direct investment (FDI) on economic growth. These studies investigate various dimensions of the spill-over effects of FDI, including technology transfer, the introduction of new processes, productivity enhancements, and the creation of new market opportunities. FDI is commonly perceived as a mechanism through which technology diffuses from developed to developing nations.

Foreign direct investment is mainly considered as one of the sources of financing and brings direct and indirect identifiable and

measurable beneficial effects, knowing that they consider themselves both sources of transfers and technological and management knowledge, they also promote the creation of markets and the creation of multinational companies.

For (Herzer,D, 2012) defined FDI that is a transfer of existing assets from domestic labor abroad; like a new investments (green field), which crowds out local investments. These crowding-out effects occur when multinational companies compete with local companies for scarce resources. In addition, these are different types of FDI inflows that are important for the positive externalities they generate in the host country (M&A, greenfield, joint ventures, etc.).

In view of (Agosin & Mayer, 2000) that mergers and acquisitions do not really contribute to the accumulation of capital formation and the subsequent economic growth of the host economy. This means that the nature of foreign capital entering the host country determines the impact on its growth (portfolio investment, foreign direct investment, etc.)

However, FDI has an indirect impact on foreign trade, which occurs when multinational corporations encourage governments to improve their infrastructure, such as road networks and free zones, while reducing trade barriers. At the same time, domestic companies

can hire a skilled workforce trained by foreign companies established within the country's borders.

According TO the OECD 2002 countries will be able to attract investment in a very effective way ,It is necessary for the population to reach a minimum level of instruction and knowledge, which lies in the sustainability of human capital to create a favorable climate for FDI .

Several empirical studies have been under taken to elucidate the correlation between economic growth and Foreign Direct Investment (FDI), with a predominant focus on developing nations. These investigations delve into the impactful role that FDI plays in shaping the economic landscape. Paul ROMER in 1986 and Robert LUCAS in 1988, then taken up by (Grossman &Helpman, 1991), claim that the role of FDI on economic growth combined with an increase in infrastructure and labor productivity

Alfaro et al. (2006) conducted a study which revealed that heightened levels of Foreign Direct Investment (FDI), irrespective of the rationale behind the increase, lead to three times more additional growth in financially developed countries compared to financially underdeveloped ones. Meanwhile, employing Generalized Least Squares models,

Bhandari et al. (2007) demonstrated that an augmentation in the domestic capital stock and the influx of FDI are principal factors positively influencing economic growth. Additionally,

Adeniyi et al. (2012) explored the causal relationship between FDI, economic growth, and financial development in several small open developing economies. He indicate that the level of financial sophistication plays a crucial role in determining the benefits of foreign direct investment on economic growth within the examined economies.

Visansack KHAMPHENGVONG et al. (2017) ,Their study reveals a positive association between FDI, trade openness, and economic growth in the long run. Additionally, the Vector Error Correction Model (VECM) employed in their analysis suggests a unilateral direction in the short run between FDI, labor force, capital investment, and economic growth.

(Sarker & Khan, 2020) The results obtained from the error correction model and Granger causality analysis revealed the existence of a unidirectional causality running from GDP to FDI. Hence, the implications of this study are significant for policymaking. The identification of both short-run and long run relationships, along with the causality from GDP (economic growth)

to FDI, underscores the importance of implementing policies aimed at sustaining a stable GDP growth rate.

The empirical findings of (Chaouachi & Balsalobre Lorente, 2022) confirm the validity of the N-shaped EKC in Algeria over the long term. Moreover, they suggest that FDI plays a role in mitigating the adverse effects of fossil fuel sources in Algeria's energy mix by facilitating a shift towards a cleaner energy mix pattern. These empirical results underscore the need for the establishment of appropriate policies following the golden decade of FDI in Algeria, particularly in light of efforts to restore ascending levels of FDI post the 2008 financial crisis and the ongoing COVID-19 crisis. Accordingly, policymakers should recognize the benefits of FDI in promoting environmentally sustainable investment, which is crucial for achieving a transition to sustainable development in Algeria.

3-FOREIGNE DIRECT INVESTSEMENT EVOLUTION IN ALGERIA :

The historical assessment of Foreign Direct Investment (FDI) in Algeria is divided into several key periods; in 1994, FDI in Algeria experienced a significant improvement due to the privatization process and debt rescheduling

After 1998, the evaluation of FDI began with a certain recovery in investment flows (about \$600 million after the country's gradual opening to FDI) the implementation of more attractive tax legislation and the appropriate institutional framework through a liberal investment code despite the liberalization measures put in place by the country ,these net FDI flows remain low. Pass to the decade 1990-2000, where the flow of FDI remains very low and in no way reflects the attractiveness of the economy, which remains highly endowed with factors of production. At the beginning of 2001, Algeria tried to attract investors in certain sectors, such as hydrocarbon, telecommunications, this growth continued until 2010. After a decrease due to a flagrant deceleration until 2015

after the various improvements in finance laws and investment policy (international bilateral conventions and treaties relating to investment) in 2016,

a recorded recovery due to the continuation of reforms in most sectors that affect economic activity and the functioning of institutions even if it is experiencing a highly conflicting inertia is able to contribute to the increase of production capacity to stimulate national competition and to facilitate the appropriation of technology transfers.

Figure 1: net FDI flows



Source: elaborated by the author from UNCTAD data

Under Ordinance No.01/03 from August 20, 2001, any individual or entity, whether public or private, domestic or international, is permitted to invest in the production of goods and services, as well as in projects involving concessions and/or licenses. In 2019,² Algeria abolished the "51/49" rule, which mandated Algerian majority ownership in all newly established businesses, although this requirement is still maintained for key sectors such as hydrocarbons, mining, defense, and pharmaceuticals, allowing foreign investors to acquire majority shares in local companies outside these strategic areas. Despite its rich natural resources and economic resilience, Algeria's attraction of foreign direct

² <https://www.btrade.ma/fr/observer-les-pays/algerie/investir>

investment (FDI) has been negatively impacted in recent times by social challenges and the global COVID-19 pandemic.

Based on the World Investment Report 2022 from UNCTAD, foreign direct investment (FDI) in Algeria saw a reduction of 23.9%, dropping to \$870 million in 2021, predominantly targeting the natural resources sector. In the most recent evaluation of Algeria's investment environment by the State Department, it has been observed that the United States and Italy are now leading foreign investors in Algeria, surpassing France, which historically held the position of the primary investor. At a national level, the main countries investing in Algeria include the United States, Italy, France, and Spain..

Table 1: FDI figures

Registered nurse	2020	2021	2022
Inward FDI flows (USD million)	1.143	870	89
FDI Stocks (USD million)	33.107	33.977	34.066
Number of greenfield investments *	6	10	4
Value of Greenfield Investments (USD million)	82	861	136

Source: elaborated by B' TRADE from UNCTED data

Investment is severely hampered by protectionist measures as well as corruption, bureaucracy, a weak financial sector and legal

uncertainty over intellectual property rights are serious barriers to investment. The requirement will be maintain for the "strategic sectors", more specifically the field of hydrocarbons, mining, defense, the import of goods intended for resale in Algeria and pharmaceutical production. The government also approved a new hydrocarbons law, taxes conditions, contract flexibility to attract new international investors (Following the promulgation of this law,

major international oil companies signed memoranda of understanding with the national hydrocarbons company SONATRACH).Algeria ranks 115 th among 132 economies in the 2022 Global Innovation Index and 167 th out of 177 countries in the 2022 Index of Economic Freedom.

4-EMPIRICAL INVESTIGATION:

To answer the posed problem, a Vector Error Correction Model was utilized. Based on a time series spanning from 1991 to 2022, sourced from the World Bank statistics, the following variables were selected:

Dependent variable:

GDP: gross domestiqueproduct

Independent variables:

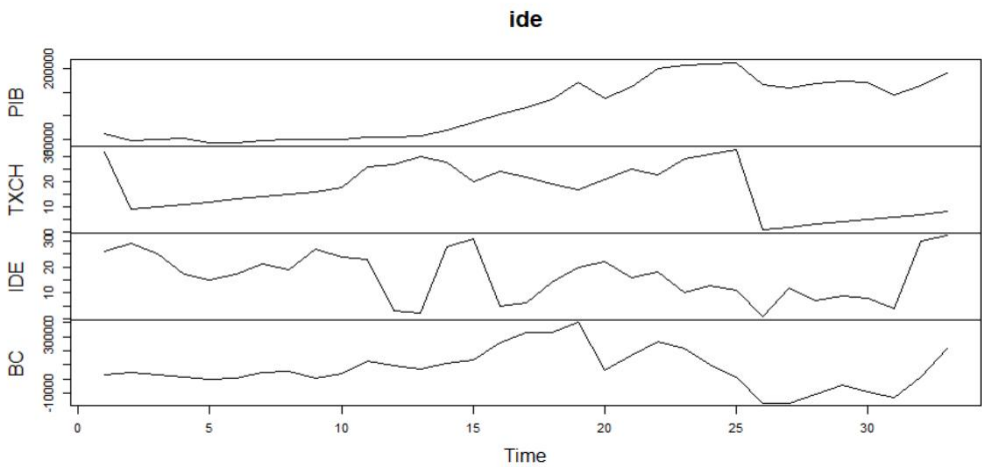
FDI :foreign direct investment

ER :EXCHANGES RATE

TB : TRADE BALANCE

1. Study of the stability of time series:

Figure 2: Graphical representation Series of study variables

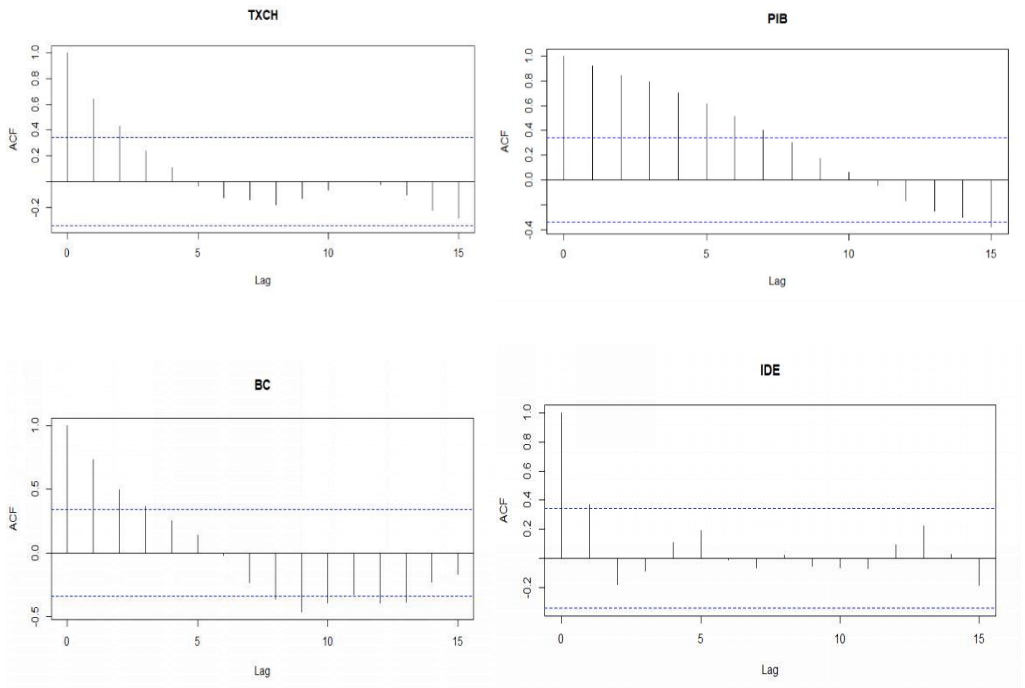


Source: Prepared by the researcher based on the outputs of the R STUDIO program

The first inspection of the above graphic curves shows fluctuations that initially suggest instability at all Series around a fixed mean,

and therefore we will use correlation functions Self and shown in the following figure.

Figure 3: Graphical representations of autocorrelation functions



Source: Prepared by the researcher based on the outputs of the R STUDIO program

We notice from the form of the autocorrelation functions that it takes time to reach the confidence interval, so we say that The chains are unstable in plane

To confirm this, we used the ADF test (Augmented Dickey-Fuller Test), and the results were as follows

2. ADF test (Augmented Dickey-Fuller Test):

Table 2: ADF test results

Variables	Dickey-Fuller	P-value
GDP	-1,963	0.5821
FDI	-2.881	0.2323
TB	-1.7469	0.6708
ER	-1.9536	0.5909

Source: Prepared by the researcher based on the outputs of the **R STUDIO** program

We observe from the results of the ADF test that the p-value is greater than 0.05 for all variables except for the FDI variable, where this value is less than 0.05, and therefore we say that all series are not stable at the level except for the inflation series, which is considered stable at the level.

3. Determine the slowdown coefficient LAG :

To determine the slowdown coefficient, we use the varselect test, where the results are as follows:

Table 3: VAR select test results

VAR select test results											
Criteria			Lag			Lag			Lag		
			1			2			3		
			4			5			6		
			7			8			9		
AIC(n)	5	6	4.572536e+01	4.573459e+01	4.531324e+01	4.161736e+01	-Inf	-Inf	-Inf	-	-
HQ(n)	5	6	4.594125e+01	4.612320e+01	4.587456e+01	4.235140e+01	-Inf	-Inf	-Inf	-	-
SC(n)	5	6	4.672014e+01	4.752520e+01	4.789967e+01	4.499963e+01	-Inf	-Inf	-Inf	-	-
FPE(n)	5	6	7.489574e+19	9.226352e+19	1.101674e+20	1.487686e+19	NaN	0	0		
AIC(n)	10	11	-Inf	-Inf	-Inf						
HQ(n)	10	11	-Inf	-Inf	-Inf						
SC(n)	10	11	-Inf	-Inf	-Inf						
FPE(n)	10	11	0	0	0						

Source: Prepared by the researcher based on the outputs of the R STUDIO program

In order to determine the slowdown duration, we rely on the AIC criterion by taking the slowdown duration that corresponds to the smallest a value for the AIC criterion, so the lag period in this model is 5

4. Cointegration test:

To verify the presence or absence of cointegration of the study variables, we use the Johansen test. Its results were as follows:

Table 4: Johansen test results

```
#####
# Johansen-Procedure #
#####
```

Test type: trace statistic , without linear trend and constant in cointegration

Eigenvalues (lambda):

[1] 6.387018e-01 3.861869e-01 3.100964e-01 6.720740e-02 -1.322946e-16

Values of teststatistic and critical values of test:

	test	10pct	5pct	1pct
r <= 3	2.16	7.52	9.24	12.97
r <= 2	13.66	17.85	19.96	24.60
r <= 1	28.79	32.00	34.91	41.07
r = 0	60.35	49.65	53.12	60.16

Source: Prepared by the researcher based on the outputs of the R STUDIO program

We have many observers, on the table, the presence of current currency relations in the “Trace Test” and other relations in the “Eigenvalue Test”, which allows Rejeter the hypothèse nulle au niveau de signification de 5%. , this table Many more relations exist for a long period in the variables of the study (PIB, FDI, ER,TB). This includes the presence of more valuables Cointegration and a combination of statistic lines and variables. Here we are using the vector error correction model (VECM).

5. **Short-term estimation of vector error correction model (VECM):**

According to the presentation theorem of Engle and Granger (1987), the natural extension of the Cointegration involves modeling short-term dynamics. The long-term dynamic is Described by the cointegration relationship in vector error correction models. In other words, according to this theorem, for any cointegrated series, it is necessary to model, then, the relationship using a VECM on the differences. The error correction model is a particular form of autoregressive models (VAR) used on data differentiated to produce stationary series, reinforced by correction terms of error. This is useful for studying which variables are influenced by the terms of error correction, but at the same time make Granger causality difficult, it is why VAR models are often used to complement VECM. The results of Shortterm estimates of the vector error correction model are presented in the table **Eigenvectors, normalized to the first column:**

Table 6: Eigenvectors, normalized to the first column:

Eigenvectors, normalised to first column:
(These are the cointegration relations)

	PIB.12	TXCH.12	IDE.12	BC.12	const
ant					
PIB.12	1.000000e+00	1.000000e+00	1.00000	1.000000e+00	1.000000e
+00					
TXCH.12	-4.218453e+04	4.115874e+03	24436.15895	6.081966e+02	-2.283713e
+03					
IDE.12	1.417844e+05	1.353810e+04	2679.56705	1.797534e+03	2.344870e
+03					
BC.12	-7.910373e+01	6.764885e+00	-15.37215	4.548828e+00	8.947828e
-01					
constant	-1.617362e+06	-3.806344e+05	-469963.28544	-3.063834e+05	-9.552792e
+04					

Weights W:
(This is the loading matrix)

	PIB.12	TXCH.12	IDE.12	BC.12	constan
t					
PIB.d	-3.370279e-03	4.459921e-02	-1.512601e-02	-2.531214e-02	-1.121546e-1
6					
TXCH.d	1.036677e-06	4.809301e-06	-2.037677e-05	-2.200060e-06	9.841266e-2
1					
IDE.d	-4.799211e-06	-2.939600e-05	-7.735163e-06	-3.004003e-06	7.181509e-2
0					
BC.d	5.209159e-04	7.643264e-03	-5.750898e-04	-1.565455e-02	

Source: Prepared by the researcher based on the outputs of the R STUDIO
program

These results indicate a cointegration relationship among the variables GDP (Gross Domestic Product), TXCH (exchange rate), IDE (foreign direct investment), and BC (trade balance). The eigenvectors show the strength and direction of this relationship.

The weights in the loading matrix indicate the relative importance of each variable in the cointegration relationship. These weights demonstrate how variations in the GDP, TXCH, IDE, and BC variables contribute to the formation of the cointegrated relationship.

these results suggest that there is a long-term relationship among GDP, exchange rate, foreign direct investment, and trade balance, and that these variables are cointegrated, meaning they move together in the long run.

Estimation of vector error correction model (VECM)

Table 7: estimation of vector error correction model (VECM)

##Model1 VECM

Full sample size: 33End sample size: 27

Number of variables: 4Number of estimated slope parameters 88

AIC 226.1901BIC 344.1112SSR 4984936220

Cointegrating vector (estimated by ML):

PIB	TXCH	IDE	BC
r1	1	-12349.04	10129.03 8.556276

ECT	Intercept	PIB -1	
Equation PIB	0.2474(0.2339)	-6701.9538(19201.1939)	-0.0706(1.0852)
Equation TXCH	0.0001(4.1e-05)*	-5.8882(3.4044)	0.0002(0.0002)
Equation IDE	0.0001(8.5e-05)	-6.3148(6.9618)	-0.0004(0.0004)
Equation BC	0.0515(0.1208)	2266.7876(9917.9762)	-0.2898(0.5605)
TXCH -1	IDE -1		
Equation PIB	499.8554(1473.0924)	-2803.0193(3249.2944)	
Equation TXCH	0.3757(0.2612)	-1.7052(0.5761)*	
Equation IDE	0.2170(0.5341)	-1.4806(1.1781)	
Equation BC	-148.6646(760.8952)	-133.2860(1678.3552)	
BC -1	PIB -2	TXCH -2	
Equation PIB	-0.9800(2.0848)	0.5988(1.1919)	673.2494(1616.0768)
Equation TXCH	-0.0013(0.0004)*	-8.1e-05(0.0002)	0.3160(0.2865)
Equation IDE	-9.8e-05(0.0008)	0.0006(0.0004)	0.4467(0.5859)
Equation BC	0.0455(1.0769)	0.2029(0.6156)	84.5733(834.7508)
IDE -2	BC -2	PIB -3	
Equation PIB	-2936.3007(3081.7636)	-2.7488(2.9544)	-0.2790(1.3666)
Equation TXCH	-1.1291(0.5464).	-0.0008(0.0005)	-0.0002(0.0002)
Equation IDE	-2.0381(1.1174)	-0.0021(0.0011)	-0.0011(0.0005).
Equation BC	-334.0488(1591.8207)	-0.8001(1.5260)	-0.4787(0.7059)
TXCH -3	IDE -3	BC -3	
Equation PIB	515.3318(1785.6168)	-2074.0291(3004.8652)	-1.2507(2.2452)
Equation TXCH	0.4622(0.3166)	-0.7116(0.5328)	-0.0009(0.0004).
Equation IDE	0.6832(0.6474)	-1.3201(1.0895)	0.0011(0.0008)
Equation BC	222.3529(922.3231)	25.3976(1552.1004)	0.3251(1.1597)
PIB -4	TXCH -4	IDE -4	
Equation PIB	-1.0015(1.7408)	1046.4622(1286.9184)	-421.1650(1645.4241)
Equation TXCH	-0.0011(0.0003)*	0.9714(0.2282)**	-0.2735(0.2917)
Equation IDE	-0.0003(0.0006)	0.5807(0.4666)	-0.3480(0.5966)
Equation BC	0.1805(0.8992)	150.1148(664.7309)	331.7083(849.9095)
BC -4	PIB -5	TXCH -5	
Equation PIB	-0.3087(2.6482)	-2.8481(2.1364)	3328.5881(2266.1202)
Equation TXCH	0.0008(0.0005)	-0.0009(0.0004).	0.9901(0.4018).
Equation IDE	6.3e-05(0.0010)	-0.0007(0.0008)	0.8073(0.8216)
Equation BC	-0.7776(1.3679)	-1.0815(1.1035)	1031.7561(1170.5171)
IDE -5	BC -5		
Equation PIB	25.4714(1700.1807)	3.4197(2.3693)	
Equation TXCH	0.2689(0.3014)	0.0008(0.0004)	
Equation IDE	-0.4723(0.6164)	0.0006(0.0009)	
Equation BC	74.0471(878.1929)	1.2775(1.2238)	

Source: Prepared by the researcher based on the outputs of the R STUDIO program

In this VECM model, several types of relationships between variables are examined:

Cointegration relationship:

The eigenvectors and the cointegration vector (r_1) indicate the existence of a cointegration relationship between GDP, exchange rate, foreign direct investment (FDI) and trade balance (CB). This means that these variables evolve together in the long term.

Short-term relationships:

The estimated coefficients in the error correction equations (ECTs) indicate short-term adjustments between variables. For example, the values of the coefficients in the equations GDP -1, TXCH -1, IDE -1, BC -1, etc., represent the short-term effects of variations in these variables on themselves and on other variables.

Delayed effects:

Terms with negative subscripts in the equations (like GDP -1, TXCH -2, FDI -3, BC -4, etc.) show the delayed effects of variables on themselves or on other variables in the system. These delayed effects are also important for understanding the dynamics of the system.

the VECM model analyzes both short-term and long-term relationships between the economic variables examined. It helps

understand how variables interact with each other and how these interactions impact the economy as a whole.

CONCLUSION

In this research The analysis using the VECM model reveals several significant results regarding the relationship between key macroeconomic variables, namely GDP, exchange rate, foreign direct investment and trade balance .

First, the results indicate the existence of a cointegration relationship between these variables, which suggests that they move together in the long-run. The eigenvectors associated with the variables show the strength and direction of this relationship, with significant weights in the loading matrix, highlighting the relative importance of each variable in the cointegration relationship.

More precisely, the coefficients estimated in each equation of the model reveal significant impacts of certain variables on others. For example, FDI appears to have a significant positive impact on GDP in the long- run, suggesting that foreign direct investment

contributes positively to economic growth in Algeria.

Additionally, the exchange rate and trade balance also show significant effects on GDP, although to a lesser extent.

This study provide important indications on the determinants of GDP in Algeria and highlight

The importance of FDI, exchange rate and trade balance in promoting long-term economic growth

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