Analysing the Impact of Macroeconomic Variables that Attract Foreign Direct Investment in Algeria, Using Autoregressive Distributed Lag Model (ARDL) for the Period (1990/2018)

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Abstract :

Algeria has contributed to improve the investment climate, restoring macroeconomic balances and liberalizing the economy through some structural reforms which contributed to the development the foreign investment. Through this analytical study, we tried to analyse and measure the impact of some macroeconomic variables that affected foreign direct investment in Algeria during the period 1990-2018, based on the ARDL methodology. The results showed a long-term equilibrium relationship between the explained variables and the dependent variable (foreign investment). However, the effect of the independent variables studied on the dependent variable is weak during the study period, due to the sensitivity of the variable dependent on the fluctuations of world oil prices; in addition to the absence of the problem of self-correlation of the sequence of errors with the stability of capabilities over time, which indicates the stability of the foreign direct investment equation.

*Key Words***:** Algeria, ARDL model, Foreign direct investment, investment climate, macroeconomic variables

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Introduction:

The global economic arena has witnessed unprecedented transformations since the beginning of the nineties, mainly represented in consolidating the signs of globalization by opening markets, removing various restrictions to international trade and increasing the volume of financial exchanges, including foreign direct investment. The latter whose role has increased according to the endeavor of all countries of the world to create a suitable investment climate for it as an alternative or complementary source for financing economic development, and a tool for integration into international networks of production, marketing and distribution, improving economic performance and the competitiveness of companies.

Algeria is one of the countries that sought to develop its investment climate through comprehensive structural reforms and the development of flexible

economic and legal mechanisms that focused on improving the performance of macroeconomic variables and updating the systems, laws and legislation governing investment, especially with regard to the system of incentives, guarantees and financial privileges in order to increase the state's capabilities to obtain the largest amount of foreign direct investment. Through this study, we will focus on some economic variables that have a prominent effect in attracting foreign direct investment.

Macroeconomic variables occupy a primary position within the investment climate indicators, as they greatly affect the investment decision, the strategy and the quality of inward investment. Therefore, the state has made great efforts to develop its performance in a manner that reflects the overall economic balance. These efforts were translated into investment laws that demonstrated the strong will of the state to promote investment and develop its climate and its working mechanisms. Targeting minimum structural distortions, as well as stabilizing monetary and fiscal policies and liberalizing various aspects of economic activity.

Based on the above, the problematic of the study revolves around the following question:

What are the most important macroeconomic indicators affecting the attraction of foreign direct investment in Algeria? To what extent the investment climate will be influenced?

The Importance of the Study: The importance of the study lies in assessing the impact of some of the most important macroeconomic variables in attracting foreign direct investment to Algeria after the structural economic reforms it undertook as part of its efforts to integrate into the world economy; also its attempts to improve the investment climate, by building a standard model that defines the impact of these variables and shows the extent to which the results match with the economic theory.

Objectives of the study: The study seeks to achieve the following objectives:

- A review of some previous experimental studies that dealt with the subject of the study.
- Analyzing the development of some macroeconomic variables in Algeria which attracted foreign investment during the period 1990-2018.
- Building a standard model that determines the impact of some macroeconomic variables on foreign investment in Algeria and the quality of the relationship that binds them.

Study Methodology: We relied on the descriptive and analytical approach regarding the theoretical concepts of foreign direct investment and analyzing the development of some influencing economic variables, supported by the standard method to know the degree of correlation and influence between these variables and foreign direct investment.

I. Litterature Review Studies:

1. A study entitled with: The impact of the economic determinants on FDI inflows in developing countries (Algeria as a model in the period 1990 / 2017) (Arbaoui manal, 2019)

This study aims to analyse and estimate the impact of the economic determinants of foreign direct investment in Algeria during the period 1990/2017 using the ARDL model. The study relied on the following independent variables: the ratio of exports to GDP, gross domestic product, inflation rate, current external account balance, size of foreign exchange and gold reserves; and for the dependent variable is represented in foreign direct investment flows. The study concluded a set of results, the most important of which are:

- An improvement in the inflows of foreign direct investment into Algeria during the study period, but this improvement does not correspond to the available capabilities and incentives granted in the field of investment, in addition to its large concentration in the oil sector.
- The impact of the study variables varied in attracting foreign direct investment. The results of the assessment indicated a positive relationship between the size of foreign currency reserves, gold and foreign direct investment flows, but they are weak. While there is a negative impact of the GDP on foreign direct investment flows, the absence of any effect on the rate of inflation and the balance of the general budget and this contradicts expectations and economic theory. This result was explained by the ineffectiveness of macroeconomic policies and their inability to attract foreign direct investment during the study period.
- The effectiveness of trade policy in attracting foreign direct investment. The results showed that there was a strong positive impact of the trade policy indicator "current account balance" on the volume of foreign direct investment. This was explained by the openness of the national economy to the outside world, and the increase in its competitive strength, and this reflects the state's ability to manage its trade policy.

2. A study entitled with: Measuring the impact of some macroeconomic variables on the flow of foreign direct investment in the Iraqi economy during the period 2003-2014 (Rezak, 2014)

In the theoretical side, the researcher presented a descriptive and analytical study of the reality of foreign direct investment and the macroeconomic variables in Iraq during the study period. As for the practical side, the researcher tested the interactive relationship between the development of foreign direct investment and the rate of growth of GDP in Iraq to find out the extent and degree of its impact by relying on a model (ARDL), and the study concluded a set of results as follows:

- The existence of a long-term relationship between foreign direct investment and macroeconomic variables, such as growth in GDP, per capita GDP, and economic openness.

- The investment climate in Iraq did not contribute to stimulating and attracting foreign direct investment to the required level and its concentration in the oil sector, due to the weakness of security, political and economic stability.

II. Foreign direct investment and economic theories
1. Definition of foreign direct investment

Foreign direct investment has received a great attention from international organizations as it is a long-term movement of capital and a form of external financing that is alternative to foreign loans. The International Monetary Fund defined it as" an activity that reflects the goal of a resident entity in one economy obtaining a permanent interest in an institution residing in another economy. This interest involves a long-term relationship between the direct investor and the institution, in addition to the direct investor's enjoyment of a large degree of influence in the management of the institution" (FMI, 1993). According to the United Nations Trade and Development Organization (CNUCED), foreign investment includes three components:

- Equity capital
- Reinvested earnings
- Other capitals, such as Intra-company, Debt deals concluded between External branches and the Main Company.

The Algerian legislator defines foreign direct investment according to Law No. 01/10 of July 3, 2001, which includes the Mines Law as:

- Acquisition of assets as part of the development of new activities, expansion of production capabilities, rehabilitation, or restructuring
- Contribution to the capital of an institution in the form of cash or resources.
- Restoring activities in the context of partial or total privatization.

Most international organizations and legislations agree that foreign direct investment is those investments that are owned and managed by the foreign investor either because of his full ownership of them or his ownership of a share of them that guarantees him the right to manage. Its advantages include transferring resources and gaining control (Krugman, 2001), which means it focuses on two important elements, namely ownership and decision-making authority in management; whereby the investor's ability to make administrative decisions, management, and total or partial ownership of the investment based on the participation rate related to the investment project, which is equal to or greater than 10%.

2. Investment Climate

The investment climate is defined as the totality of the political, security, economic, social, legal, administrative and institutional conditions prevailing in a country, as these variables interact with each other to generate new conditions that can help attract investments or lead to their deterrence. (Zeebat, 2004) , These variables can be divided into economic and non-economic.

2.1. Economic factors:

It includes a set of elements indicating the level of economic performance, the most important of which are:

- Stability of economic policy: Economic policy regarding investment climate is viewed through three sub-angles: fiscal policy, monetary policy and foreign trade policy.
- The degree of economic openness.
- The strength and growth of the local economy.
- Investment incentives.

2.2. Non-economic factors:

They are represented by the elements that indirectly affect economic activity by facilitating economic work and providing a suitable environment for business, we mention among them:

- Political and security stability.
- Legal and regulatory framework

3. Foreign direct investment theories

The economic literature has dealt with theories of foreign direct investment with the aim of determining the motives of companies investing abroad. The traditional theories has explained the reasons for the establishment of foreign investments which focused on the principle of specialization based on the concept of reducing production costs and maximizing benefits; there are those who focused in their analysis on the principle of technological superiority, as it showed that the difference in the level of technology leads to a corresponding difference in the comparative advantages acquired that enable companies to enter the international markets of countries that lack these advantages. Some theories considered the company's international investment as a stage of the company's development or product development; while the theories based on the market structure considered that investment is related to the imperfection of the market in the host country, and the company's attempt to gain a monopolistic or competitive advantage, whether related to technology, knowledge, or the ability to benefit from economies of scale, and even on the market deficiencies in addition to the advantages of the site, or it is related to the financial concepts as it attributed the investment motive to the company's desire to maximize the return and reduce the risks through the distribution of its investments abroad. As for modern theories, they focused their analysis on strategic arbitration between investment or export and the granting of exploitation licenses. Companies choose to invest abroad according to the selective theory if they are able to assemble the elements of the selective model represented by the special advantages "O" (Advantage Ownership)" Advantage of settlement abroad "L" (advantage Location), "I" (Advantage Internalization); desiring to maximize its profits, avoid transaction costs, and take advantage of the comparative and incentive advantages of the settlement site.

III. Analysis of the evolution of the macroeconomic variables that attract foreign direct investment in Algeria for the period 1990-2018

The direction of investment towards specific regions is not random, but is based on a careful study of the characteristics and determinants of the investment climate of the host country, especially the macroeconomic variables. Perhaps the most prominent of these variables according to economic studies and literature are the following:

1. Monetary cluster:

According to economic theory, it is expected that the monetary cluster will have a positive effect on the flow of foreign direct investment (Ismail, 2017) The growth of the money supply leads to an increase in the circulation of liquidity in the economy, lower interest rates, and consequently an expansion in demand for loans, and thus increased investment; In view the complex monetary conditions in the Algerian economy, the development of the monetary cluster during the study period 1990-2018 can be analysed at the level of four stages:

1.1. The first phase 1990/1994:

This stage witnessed an expansion in the money supply due to the Central Bank of Algeria's adoption of an expansionary monetary policy to finance the budget deficit (Figure 1), this is in spite of the strict instructions assigned by the International Monetary Fund within the framework of the first credit preparation program in May 1989, the second credit readiness program in June 1991, and the third credit readiness programs in April 1994. Most of the instructions centred on controlling the money supply and the need to maintain overall balances, reducing the inflation rate and achieving stable and acceptable growth at a rate of 3% in 1994 and a rate of 6% in 1995, in addition to the liberalization of foreign trade from any possible obstacles.

1.2. The second phase 1995/2000:

This phase was characterized by the adoption by the Algerian Bank of a strict contractionary monetary policy aimed at reducing the rate of inflation and achieving monetary stability, especially after the adoption of the compulsory reserve tool as an indirect monetary method to monitor the growth of the monetary cluster. Therefore, we observed (Figure 1) a slowdown in the growth of the money supply, and the restriction of monetary policy coincided with the adoption of the expanded loan program from 1995 to 1998.

1.3. The third phase 2001-2014:

During this phase, the Central Bank adopted an expansionary monetary policy, coinciding with the implementation of the economic recovery program that extended from April 2001 to April 2004, the program to support economic recovery for the period between 2005/2009, and the economic growth consolidation program for the period 2010/2014, As the macroeconomic indicators in the national economy have been strengthened in a positive way, and many factors have contributed to improving the monetary situation and pushing it towards expansion, among them the increase in oil prices, which reached 65.9 dollars per barrel in 2004. (Algerian Bank, 2006); However, it is noticeable from

(Figure 2) a slowdown in the growth of the money supply that started from the year 2008, due to the negative effects of the global financial crisis and the decline in state revenues from hard currency as a result of the decline in world oil prices and the balance of payments deficit (Algerian Bank, 2017)

1.4. The fourth stage 2015/2018:

(Figure 01) shows a slowdown in money supply growth, due to several reasons, foremost of which is the 2014 global pipeline crisis, which led to a sharp decline in oil prices at the global level compared to the reference price for preparing the budget, which fell to 54$ in 2017. (Algerian Bank, 2017), When he set the reference price for the 2017 budget at 50$ (United Nations Economic Commission report, 2017), This has directly affected official reserves, as they moved from $ 178 billion in December 2014 to $ 97.33 billion at the end of 2017 (Algerian Bank, 2017) In addition, Algeria was affected by the Eurozone crisis, and these reasons coincided with the launch of programs to support expanded economic growth 2015/2019, and as a result, the monetary authorities took decisive measures related to controlling the financial path and rationalizing expenditures, and starting from 2017 we noticed a significant increase in the money supply due to Algeria's adoption of a policy of unconventional financing that began in November after amending the Monetary and Loan Law 10/90 under Law 10/17 amending and supplementing the order 11/3, and the amendment appears through the inclusion of Article 45 bis of the 11/03 (Official Gazette, 2017), where 19 billion dollars was pumped, equivalent to 2185 billion Algerian dinars (Seminar on Unconventional Finance, 2018) in order to cover the needs of the public treasury and finance the National Investment Fund and finance local debt.

2. Inflation Rate:

Inflation is an indicator of monetary policy, which has an inverse relationship with foreign direct investment (Omar Saqr, 2003), the inflation's rate development in Algeria has witnessed three phases:

2.1. The first phase 1990/1995:

This phase witnessed an unprecedented increase in the rate of inflation, as it rose from 29.77% in 1995 (Figure 02). as a result of applying the policy of openness to the market economy and the consequent liberalization of foreign trade, in addition to price liberalization by raising financial support on some basic materials and the direction of the national economy towards adopting an expansionary monetary policy.

2.2. The second phase 1996/2000:

During this phase, the inflation rate witnessed a rapid decline, reaching in the year 2000, to 0.34% (Figure 02). This is due to the Central Bank's adoption of a contractionary monetary policy. At the outset, the results of the economic reform program were achieved, especially those related to restoring the great balance of the economy and achieving financial stability by reducing the inflation rate to less than 10%. (Shibian, 2017).

2.3. The third phase 2001-2018:

The most important characteristic of this phase is the wage increases that led to an increase in overall demand and the prices of basic consumer goods, as the inflation rate exceeded 8% in 2012, to decline in 2014 to 2.9% (Figure 02), this is thanks to the state's efforts that were embodied in the new direction of monetary policy, which considered that its ultimate goal is targeting inflation and stabilizing it within the limits of 3%,In 2017, it increased within 6% as a result of the Bank of Algeria's adoption of the policy of unconventional financing and the expansion of the money supply, as the compulsory reserve rate decreased to 4%, in order to cover the needs of the grief and finance the public debt and the National Investment Fund, then to decrease to 4.27% in 2018.

3. Exchange Rate:

Exchange rates interact adversely with foreign direct investment. Investments are attracted to countries after devaluation occurs, or when they expect inflation in the host countries because exchange rate fluctuations lead to rapid changes in the relative profitability of investment returns in the host countries (Nasri, 2011), the exchange rate witnessed important developments that can be analysed on the level of three phases:

3.1. The first phase 1990/1999:

The most important feature of this phase is the adoption by the monetary authority of a policy of gradual slipping of the dinar from the beginning of 1987 to 1991, whereby the value of the dinar was reduced by 22% in relation to the dollar during the year 1991 in accordance with what was agreed upon with the International Monetary Fund. The aim of this reduction was to approximate the price of the dinar in the official market and the parallel market, limit the growth of the monetary cluster and rebalance the balance of payments. Under the third credit readiness program in 1994, the monetary authorities made a second devaluation of 40.17%. Such a devaluation is one of the main features of the program for macroeconomic stability and partial liberalization of foreign trade, and it is a starting point for the transition to the "Fixing" system starting from 10/01/1994 to 1995, after which the rotating float system was adopted, starting from 01/01/1996, during which the dinar became determined according to supply and demand.

3.2. The second phase 2000/2010:

This phase was linked to prominent economic stations that affected the exchange rate of the dinar, as the value of the Algerian dinar continued to decline in the period 2000/2002 (Figure 03), so it changed from 75.26 dinars against one dollar in 2000 to 79.68 in 2002. The main reason for this is the events of September 11, 2001, the collapse of the two world trade towers, and the decline of the dollar against the leading world currencies. As for the period 2003/2004, it monitored the efforts of the Central Bank to achieve monetary stability by adjusting the exchange rate value in the official market and reducing the deficit in the balance of payments. It also witnessed a significant improvement in the price of oil, which was positively reflected in the exchange rate, as the value of the dinar rose to 72.06 dinars per dollar in 2004. The exchange rate continued to improve until the explosion of the

2008 crisis, which negatively affected the oil markets in terms of price and the amount of global demand, and on the national revenues from hard currency and thus on the exchange rate of the dinar.

3.3. The third phase 2011/2018:

This stage witnessed a significant decline in the value of the Algerian dinar (Figure 03), as its value decreased from 72.94 dinars against the dollar in 2011 to 116.59 in 2018, due to the fuel sector code and the decline in oil prices, the shrinking of the state's income from hard currency as one of the direct causes. As for the indirect reasons, they lie in the shale gas and oil revolution in the United States of America, which led to a decline in demand for oil, which greatly affected its prices. In this situation, the Bank of Algeria resorted to reducing the value of the dinar in the years 2014 and 2015 within the limits of 20% in order to encourage the export sector outside of hydrocarbons and reduce the volume and import bill as a way to mobilize the public treasury with hard currency and finance development programs (Beshishi, 2016)

4. Total Domestic Product:

The study of the development of the total domestic product enables a picture of the growth and economic strength of the country to be taken, as it is a basic determinant of foreign companies searching for markets. As a result of the existence of a positive relationship between it and the inflows of foreign direct investment, as confirmed by some applied studies.

The total domestic product witnessed great developments in response to the global developments that affected the rentier-based Algerian economy, as the output fluctuated during the period 1990/1996 (Figure 04). Because of the poor security conditions, along with the accumulation of debt, the drop in oil prices, and the high cost of the state's transition to a market economy and the initiation of structural adjustment programs.

Whereas the period 1997/1999 witnessed stability in the gross domestic product in the range of 48 million US dollars, due to the political and security stability in the country, which enabled it to initiate the implementation of a set of important development programs, the most important of which is the economic recovery program, and from the year 2000 the GDP experienced a remarkable upward trend (Figure 05), where it achieved a growth rate of 5.2% in 2005, or about $ 103.2 million, to reach in 2017 to more than $ 167 million. This is due to the boom in some sectors outside of hydrocarbons, such as the construction sector, public works and the services sector (Algerian Bank, 2008/2013).

IV. The development of foreign direct investment in Algeria during the period 1990-2018:

Fiscal and monetary reforms affected the development of foreign direct investment, the period 1990/1996 was marked by an almost complete absence of foreign direct investment due to the political and security instability of the country, the complex monetary situation, as well as the exacerbation of the debt crisis; while the period extending from the year 1996/2006 witnessed the return of foreign direct

investment to Algeria (Figure 05) as a result of the reforms promulgated by the state, especially the Investment Law of 2001 in addition to the Partnership Agreement with the European Union in 2001 as a prelude to joining the World Trade Organization. The increase in fuel prices in the global markets, which encouraged foreign investors to invest in the sector, and thus Algeria occupied the third place at the level of the African continent in attracting investment according to the World Investment Report for the year 2002, and the first in the Maghreb in 2002/2004 according to the World Investment Report year 2004.

The period between 2007/2011 was marked by a noticeable increase in the volume of foreign direct investment, and this is due to the large investment recorded in the hydrocarbon sector by American and British companies, the sale of the second mobile phone license to the Egyptian Orascom company and the privatization of the Iron Industries Company in El-Hadjar

As for the period 2012/2018, it was characterized by a fluctuation in the flow of investment between high and low (Figure 05), due to the impact of the 2014 oil shock on global economies; in addition to national laws and legislation, especially Rule 51/49, which limits investors in sectors and branches of activity, as well as the absence of a clear vision in light of the continuous changes in laws and the political side.

V. Measuring the effect of macroeconomic variables in attracting foreign direct investment to Algeria, using the ARDL model:

To measure the impact of macroeconomic variables in attracting foreign direct investment to Algeria, we will adopt (ARDL), which takes into account the time lag for the slowing of the gap where the explanatory variables are distributed over time periods, the model integrates them into a number of slowdowns distributed within the limits (parameters) corresponding to the number of explanatory variables. The explained economic variables under study take a period of time to affect the dependent variable, distributed between the short and long term, and this model is adopted in the case of stability of time series at both levels (I 1) or (I 0), provided that the variables of the study are not of the second degree (I 2)

In the research we relied on annual data during the time period (1990/2018) obtained from a database of the World Bank and the National Bureau of Statistics; we also relied in the study on five variables that were converted to the logarithmic formula, which are:

Foreign Direct Investment (FDI), GDP, Inflation Rate (INF), Monetary Block (M) Real Exchange Rate (RE),

The considered model takes the following formula:

$$\text{"}lFDI = f(lGDP, lM, lINF, lRE)\text{)"}$$

1. Study of time series stability

The results of the time-series stability test schedule for the study variables will be tested, depending on the Pearson PP test, and (Table 01) shows the results:

Table No. 01: Results of the time-series stability test schedule

Study the stability of time series at the plane					
Variables	***PPcal***	***PPtab***			**Prob**	**Decision**
		%1	**%5**	**%10**		
LINF	-4.36	-4.33	-3.58	-3.22	-4.36	Unstable direction
LRE	-6.57	-3.69	-2.97	-2.62	-6.57	stable
LFDI	-2.63	-4.33	-3.58	-3.22	-2.63	Unstable direction
LM	7.57	-2.65	-1.95	-1.60	7.57	Unstable
LGDP	-2.51	-4.33	-3.58	-3.22	-2.51	Unstable direction
Study the stability of time series at the first difference					
Variables	***PPcal***	***PPtab***			**Prob**	**Decision**
		%1	**%5**	**%10**		
LINF	-2.067	-2.65	-1.95	-1.60	0.039	Stable
LFDI	-4.57	-3.71	-2.98	-2.62	0.0013	Stable
LM	-4.02	-3.71	-2.98	-2.62	0.0047	Stable (no static and directional)
LGDP	-4.47	-2.65	-1.95	-1.60	0.0001	Stable (no static and directional)

Source: Prepared by researchers based on the outputs of (EVIEWS 10) program

Through the results of the time series stability test schedule, it became clear to us that the time series for the variables (LINF, LFDI, LM, LGDP) are not stable at the level and stabilized after taking the first difference, as the values (calculated in the absolute value are greater than the critical values at a significant level (5%), as for the real exchange rate variable (LRE), it stabilized at the level where the calculated value was greater than the critical values at the level of significance (1%), (5%), (10%), and therefore the stability of the time series fulfilled the condition of using the ARDL model.

2. Cointegration test using ARDL methodology
2.1. Determining the optimum degree of delay:

To determine the length of the distributed slowdown periods, two criteria are used, either (AIC) or (SC), where the length of the period that lowers the value of each of (AIC) or (SC) is chosen as in (Figure 06) which shows that the best model is (3.2 3. 3.3.) ARDL according to the AIC standard, this means that both the dependent variable and the independent variables have delays up to the second and third degrees and thus the model is estimated on this basis.

2.2. Test of cointegration using Test Bounds

The table below shows the results of the boundary test, the results indicate that the calculated value of statistic-F (4.61) is greater than the critical values of the lower and upper bound at levels of significance 10%, 1%, and 5% from which we reject the null hypothesis that states that there is no complementarity relationship There is a commonality between the explained variables and the dependent variable, which means that there is a long-term equilibrium relationship between the foreign direct investment and the study variables.

Table No. 02: Results of cointegration test using Test Bounds method

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	4.619261	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
Actual Sample Size	25	Finite Sample: n=30		
		10%	2.525	3.56
		5%	3.058	4.223
		1%	4.28	5.84

Source: EVIEWS 10 Program Outputs

2.3. Estimating the model in the long term

The long-term relationship was assessed to test the significance of the parameters of the study variables in the long term. The results shown in (Table 03) indicated the ineffectiveness of monetary policy in attracting foreign direct investment, as we noticed the insignificance of the relationship between inflation and foreign direct investment despite the existence of the inverse relationship. This result may be explained by the lack of the effect of the inflation rate on foreign direct investment during the study period, as a result of the concentration of investment coming into Algeria in the field of hydrocarbons and its derivatives, and accordingly, the profits generated on investment are not significantly affected by inflation rates, as they are valued in dollars, not dinars.

The results also showed the positive impact of the gross domestic product on foreign direct investment, as an increase in the GDP by 1% leads to an increase in foreign investment by 1.41%, and this is explained economically by the increase in the state's public revenues, especially during the period 2000/2008 as a result of high oil prices and the direction of investors towards investment In the field of oil resources. The results also showed the lack of significance of the relationship between money supply and foreign direct investment with the existence of the inverse relationship and this is inconsistent with economic theory; however, this relationship can be explained economically by the adoption of Algeria's policy of expanding money supply in an ill-considered manner in order to finance the needs of public institutions and investment projects that have been programmed within the development plans which spoiled the investment climate through high inflation. This is in addition to the adoption of the policy of unconventional financing after the decline in oil revenues and failure to resort to alternative sources of financing. The results also showed that the exchange rate has a positive relationship with foreign direct investment with no significant relationship. This can be explained by the administrative management of the exchange rate by Central Bank of Algeria was not sufficient to explain the behaviour of foreign direct investment flows because the Algerian dinar was denominated much higher than its equilibrium

value during the study period, in addition to that the central bank aimed to limit the development of the monetary mass circulating in the markets Parallel to this, we see the lack of reaction of the foreign investor to the changes in the exchange rate in the long term.

2.4. Estimation of the ECM for the short-term relationship

The results of estimating the short-term relationship of the error correction model is shown in (Table No. 04). It showed that the error correction factor is significant (0.0004) and with a negative sign (-1.69) means that 69% of the defect or short-term deviation in the explanatory variables for the previous period (t-1) corrected in current period **t**; it also expresses the speed of returning to the equilibrium situation in the event of shocks displacing the Algerian economy from its equilibrium position, and that the gross domestic product and money supply did not affect the attraction of foreign direct investment due to the lack of significance of the relationship, unlike the rest of the model variables**.**

The corrected determination coefficient ratio reached 97.26%, which thus reflects the explanatory power of the model, and shows the effect of independent variables and their contribution to determining and explaining the changes occurring in foreign direct investment during the study period. The percentage remains 2.74% variables not included in the model due to the random variable.

2.5. Diagnostic tests:

To ensure the quality of the model used in the analysis and that it is free from standard problems; several tests were carried out as follows:

a. The factorial test for the serial correlation between residues: The results of the diffraction factorial test for the sequential correlation between residues LM TEST showed that the critical probability value was not significant, reaching value-Prob = 0.1413 indicating that the model was devoid of the problem of serial correlation.

Table No. 05: Results of a non-orange factorial test for serial correlation between residues

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	3.320246	Prob. F(2,4)	0.1413
Obs*R-squared	15.60194	Prob. Chi-Square(2)	0.0004

Source: (EVIEWS 10) program outputs

b. Test of the random errors distribution: The results of the random error distribution test are shown in (Fig. 07). It showed that the corresponding probability of testing your neighbour beira is greater than the various degrees of significance at 1%, 5% and 10%, and therefore the rest of the regression estimation follows the normal distribution and therefore the model is accepted statistically.

c. Stability Test Boundary Error Contrast (ARCH): The results of (ARCH) test shown in (Table 06) showed that the probability value (0.0183) is greater than 1%,

which means that the model is significant, acceptable and free of the problem of homogeneity of variance.

Table No. 06: Results of ARCH

Heteroskedasticity Test: ARCH

F-statistic	5.350980	Prob. F(2,20)	0.0138
Obs*R-squared	8.017243	Prob. Chi-Square(2)	0.0182

Source: (EVIEWS 10) program outputs

d. Structural stability test for model parameters: The structural stability of the error correction model was tested using the CUSUM test. The results showed that the estimated coefficients in the model are stable as they are located within the critical boundary area at 5% significance, which indicates the structural stability of the results of the foreign direct investment equation.

Figure 08: Results of the structural stability test for CUSUM model parameters
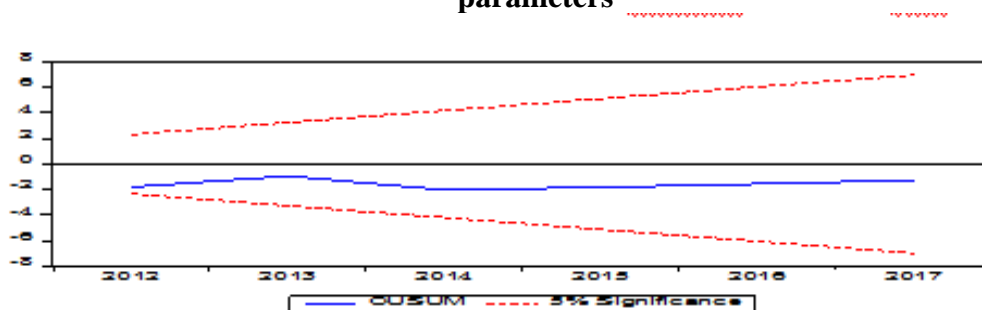
Source: (EVIEWS 10) program outputs

Conclusion:

Through this study, we analysed the impact of some macroeconomic variables on the flow of foreign direct investment to Algeria during the period 1990-2018, and through it we concluded the following results:

• Foreign direct investment witnessed a development during the study period as a result of economic reforms, especially the Investment Law of 2001, which contributed to restoring the stability of the overall balance of the economy supported by high oil prices. However, most of these investments were concentrated in the hydrocarbons sector as it is considered the strategic sector with high profitability.

• The results of the study on the long term showed that the parameter of the model variables is not statistically significant, and this indicates the weak effect of the studied variables on foreign investment during the period 1990-2018. This is explained by its sensitivity to fluctuations in global oil prices, which reduces the stability of the country's economy and spoils the investment climate, therefore foreign investors prefer to invest in the country in which the macroeconomic variables are characterized by liberalization, flexibility, stability

and efficiency, and are compatible with economic changes and transformations at the national level or global shifts.

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● Zeebat, A. (2004). Improving the climate for private investment, the case of Algeria,. The National Forum on Economic Reforms in Algeria, Marketing Practice,. Bechar University.
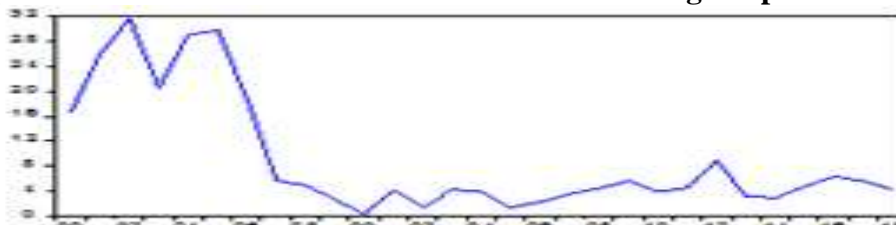
Appendices:

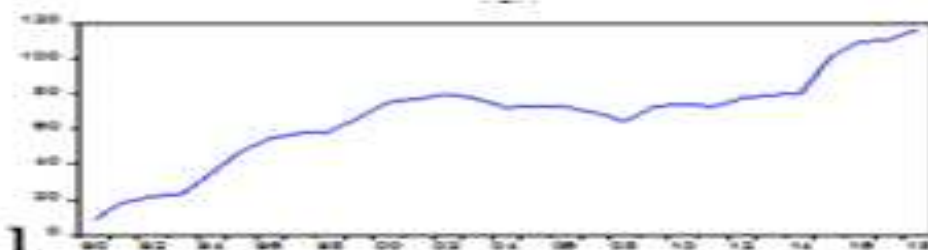**Appendix 01: The evolution of the monetary supply during the period 1990-2018**
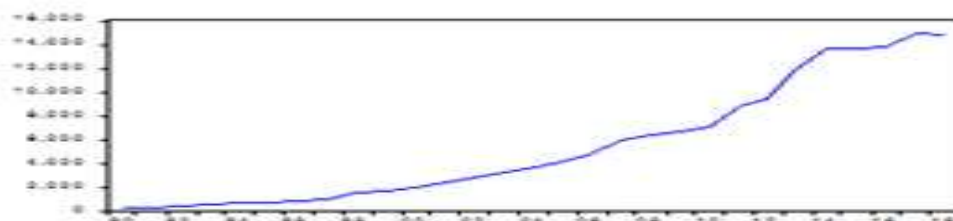
Source: Prepared by the researchers, based on the data of the annual report

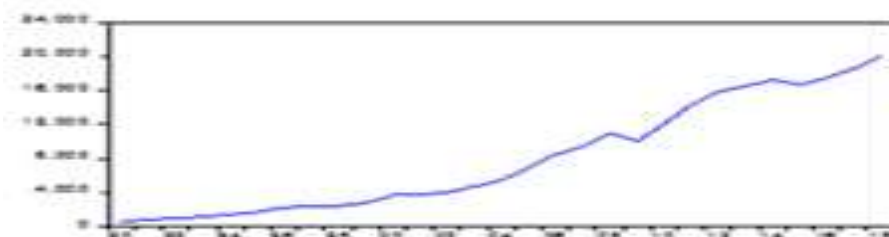**Appendix 02: The evolution of the inflation rate during the period 1990-2018**

Source: Prepared by the researchers, based on World Bank data Bank Algeria

Appendix 03: Exchange rate evolution during the period 1990-2018

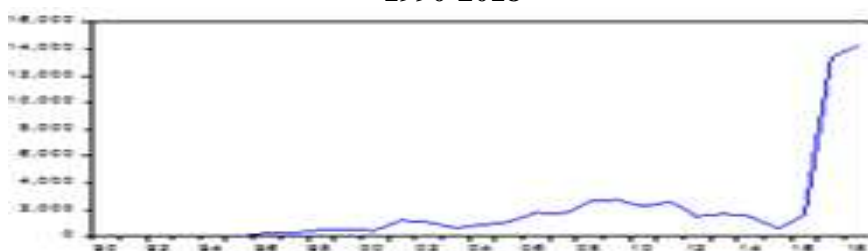**Source:** Prepared by the researchers, based on World Bank data

Appendix 04: Development of GDP during the period 1990-2018

Source: Prepared by the researchers, based on the data of the annual report of the Bank of Algeria
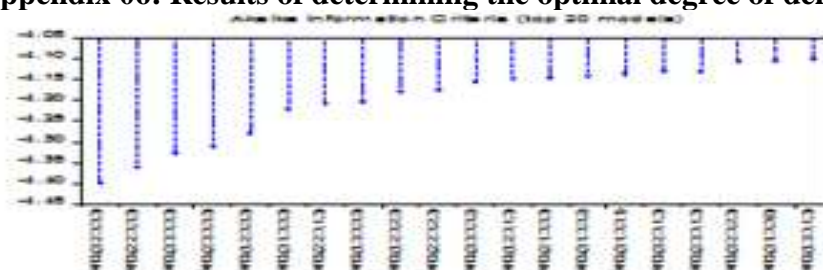
Appendix 05: The development of foreign direct investment during the period 1990-2018
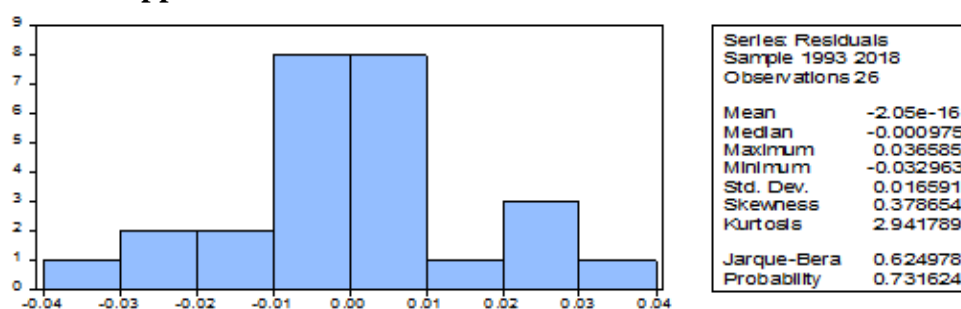

Source: Prepared by the researchers, based on World Bank data

Appendix 06: Results of determining the optimal degree of delay

Source: (EVIEWS 10) program outputs

Appendix 07: Results of the random error distribution test

Series: Residuals	
Sample 1993 2018	
Observations 26	
Mean	-2.05e-16
Median	-0.000975
Maximum	0.036585
Minimum	-0.032963
Std. Dev.	0.016591
Skewness	0.378654
Kurtosis	2.941789
Jarque-Bera	0.624978
Probability	0.731624

Source: (EVIEWS 10) program outputs

Appendix 08: Estimating the model in the long term

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LINF	-0.138491	0.840639	-0.164745	0.8746
LGDP	1.416689	0.646687	2.190689	0.0710
LM	-0.136815	0.340655	-0.401623	0.7019
LRE	0.296498	0.992235	0.298819	0.7752
C	-8.277967	7.046577	-1.174750	0.2846

EC = LFDI - (-0.1385*LINF + 1.4167*LGDP -0.1368*LMD + 0.2965*LTCH
    -8.2780)

Source: (EVIEWS 10) program outputs

Appendix 09: Estimation of the ECM error correction model for the short-term relationship

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LFDI(-1))	0.134492	0.083983	1.601406	0.1604
D(LFDI(-2))	0.134316	0.073915	1.817170	0.1191
D(LINF)	1.430702	0.147435	9.703917	0.0001
D(LINF(-1))	0.668830	0.269556	2.481227	0.0477
D(LGDP))	0.058212	0.057542	1.011651	0.3507
D(lGDP (-1))	-0.844646	0.111484	-7.576397	0.0003
D(LGDP(-2))	-0.442775	0.109783	-4.033169	0.0069
D(LM)	0.021996	0.080077	0.274690	0.7928
D(LM (-	0.029392	0.063835	0.460436	0.6614
D(LM (-2))	-0.155990	0.057490	-2.713362	0.0349
D(LRE)	-1.065317	0.093980	-11.33554	0.0000
D(LRE(-1))	-0.693465	0.158681	-4.370187	0.0047
D(LRE(-2))	-0.415256	0.099694	-4.165305	0.0059
CointEq(-1)*	-0.697300	0.097822	-7.128245	0.0004
R-squared	0.987461	Mean dependent var		0.066989
Adjusted R-squared	0.972643	S.D. dependent var		0.114230
S.E. of regression	0.018893	Akaike info criterion		-4.800979
Sum squared resid	0.003927	Schwarz criterion		-4.118408
Log likelihood	74.01223	Hannan-Quinn criter.		-4.611663
Durbin-Watson stat	2.780624			

Source: (EVIEWS 10) program outputs