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Study of the Asymmetric Effects of the Determinants of Foreign Direct Investment in Algeria Using the Method of Nonlinear Autoregressive Distributed Lag (NARDL) during the Period (1970-2018)

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Abstract

The study is aimed to show the most important determinants of foreign direct investment in Algeria as well as the standard modeling that links to their relationship during the period (1970-2018).In order to address the problematic of the research and test its hypotheses, Eviews Economic Measurement Program was used to estimate the model and reveal the existence of a common integration between foreign direct investment and its main determinants according to the method of Nonlinear Autoregressive Distributed Lag (NARDL).

The results of the tests concluded that there is a long-term balance relationship as well as an asymmetry between the size and determinants of foreign direct investment inflows, which are inflation, exchange rate, economic growth rate, population census, and external debt stocks in Algeria during the studied period.

Key words: Foreign direct investment (FDI), determinants of foreign direct investment, common integration, method of Nonlinear Autoregressive Distributed Lag (NARDL).

JEL Classification :F21,C29

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Introduction

The flow of foreign direct investment and its continuation towards developing countries depends on many determinants, including what is essential, such as political and economic stability, macroeconomic indicators and the extent of their impact on the decision concerning foreign investment, in addition to economic policies adopted by the host country for investment and the independence of the judicial system. Moreover, there are some other complementary determinants, including the size of the market and the rate of its growth in addition to the availability of qualified human resources and the strength of the communications base. Therefore, these developing countries have improved their investment climate and cleansed their business environment in order to obtain the largest amount of foreign direct investment flows.

Algeria, like all developing countries, has sought to improve its investment climate by providing the legal and regulatory framework for this foreign financial resource, in addition to working to improve the performance of its economy through improving macroeconomic indicators and trying to make it more stable and at acceptable levels, within the framework of a national policy aimed at achieving progress and economic openness to the world.

Statement of the problem

Based on the increasing interest in foreign direct investment (FDI henceforth) and the increasing intensity of competition between countries in order to attract more investments, it is evident that many decision-makers in Algeria encounter many difficulties in order to improve the investment climate with a set of economic, social and political determinants that affect the size of investment inflows to Algeria. In this study, we limit ourselves only to the most important quantitative determinants for the macro economy.

For this, we will attempt to find the most important determinants that affect FDI and determine their impact by formulating them in standard economic models, i.e. mathematical models that highlight the degree of their influence on each other. Accordingly, the main problem of the study can be formulated as follows:

What is the impact of the macroeconomic determinants on foreign direct investment inflows in Algeria?

Hypotheses:

This theory is based on several hypotheses, the most important of which are:

- The size of FDI flows is determined by a set of determinants which are mainly: economic growth, inflation, exchange rate, etc.
- The nature of the relationship between FDI flows and positive changes in economic growth rates on the one hand, and exchange rates on the other hand, which is a directly proportional relationship.
- There is an inverse relationship between both FDI inflows and positive changes in inflation rates, i.e. the higher the inflation rates, the value of the flows will in turn decrease.

Objectives of the study

The purpose of the study is to achieve the following goals:

- Following up the development path of the attractiveness of FDI in Algeria in light of the development of the most important macro-economic determinants in Algeria.
- Highlighting the most important determinants of FDI with its negative and positive impact in Algeria on the attractiveness of FDI and the nature of the relationship between them.

Methodology

The descriptive as well as the analytical approach are adopted in the theoretical aspect of the study through analyzing the trend of the development of FDI flows. However, the quantitative analytical approach with its standard analytical tools is followed in order to measure the problematic of the study in question.

1. The concept and reality of foreign direct investment:

FDI is an important source of external financing, especially for developing countries where the level of domestic savings has not been able to finance the necessary investments to achieve high rates of economic growth.

1.1. The concept of foreign direct investment

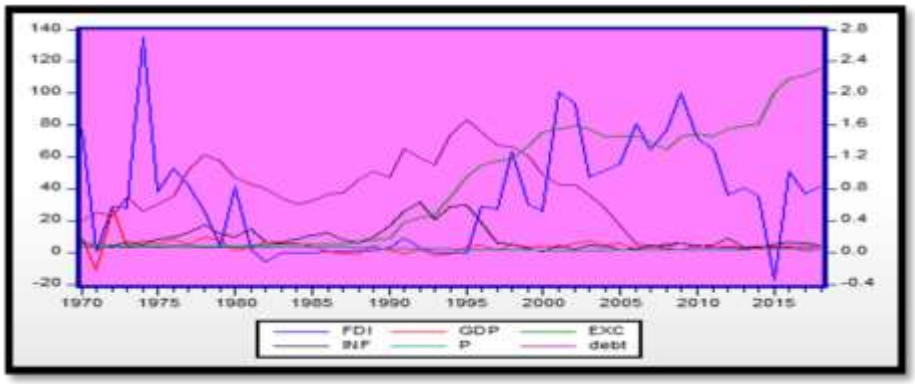
FDIs are defined as foreign funds (governments, individuals or companies) that flow within the host country with the intention of setting up projects owned by the foreign entity and take their gains after paying a portion of these gains, under conditions agreed upon with the host country (Kaki, 2013, p. 17). Moreover, Parker added that FDI also includes the process of mergers and acquisitions across borders, and it was also known as the purchase of foreign assets with the right to manage them (Al-Hadi, 2015, p. 24).

Consequently, foreign direct investment may represent the developing countries the way out and the best solution to achieve the desired development, as it contributes to creating jobs, improving productivity, and transferring modern technologies. In addition, it contributes to increasing exports and enhancing the innovative capabilities of these countries.

1.2. Analysis of the reality of foreign direct investment in Algeria

In order to identify the extent of improvement of the investment climate in Algeria in light of the change of the most important determinants, we will follow the path of the development of the volume of FDI during the period (1970-2018) through the following form:

Figure 1: Shows the path of foreign investment incoming to Algeria in light of the development of macroeconomic determinants during the period (1970-2018).



Source: Prepared by the researchers based on Eviews 10

Through reading the published statistics of Figure (01), the value of FDI flows as a percentage of the GDP in Algeria in 1970 (the beginning of the studied period) was about 1.64%, while in 1971 this percentage decreased to 0.01%, and this coincides with a high rate of External debt from 19.81% in 1971 to 25.03% in 1971.

We also notice through the above figure that the size of FDI flows during the period (1973-1989) witnessed a movement of fluctuation between increase and decrease. (1982: With ($ 53.69) million, or 0.11% of GDP),

this fluctuation in the flow rate is due to the fragility of the Algerian economy, as well as the 1986 oil crisis, among other factors.

As for the period (1990-2000): it was characterized by a lack of investment and its limited level, where its value ranged between 0.001 million and 606.6 million dollars. The lack of investment during this period was mainly due to the security crisis that Algeria experienced during the nineties, as well as the exacerbation of some economic problems such as the debt crisis.

From the beginning of 2001 to 2014, there was a noticeable recovery in foreign investment inflows to Algeria, which ranged between $ 0.6378 billion and $ 2.7453 billion, or between 0.93% and 2% as a percentage of GDP, and this recovery is due to the stimulus measures provided by the state for the beneficial of investors and the guarantees provided in accordance with the Investment Law 03-01. In addition to the improvement of the macroeconomic indicators of the national economy due to the high oil prices and the signing of several bilateral agreements between Algeria and other countries on the promotion of investment on the one hand and the protection of investors on the other and the direction of security conditions towards stability.

As for the year 2015: we note that the value of investments carries the negative value during this year, which is considered as the worst outcome in the field of FDI, as Algeria recorded a negative outcome of $ 537.79 million or -0.32 as a percentage of GDP. This means the reluctance of investors to invest in Algeria for many factors which are:

-The fragility of the Algerian economy due to the effects of the global crisis on oil prices during mid-2008.

- Slow and complex procedures and the absence of a rapid response to the institutions in charge of investment.

- The weak policies adopted by the Algerian authorities in diversifying the structure of flows outside the hydrocarbon sector.

- Lack of clarity in the field of changing legislation and laws and a stressful investment path.

The lack of investment in the energy sector also contributed to recording this outcome in Algeria as well.

After the year 2015, we can refer to the next three years which witnessed a positive improvement in the flow of foreign direct investment in Algeria, and this compared to 2015, where the value of investments ranged between $ 1.20 billion and $ 1.638 billion.

This is partly due to the improvement of investment policies and the recent improvement in oil production.

Despite this positive improvement, investments remain modest values that reflect the substandard level and the appropriate size for which the government has sought in comparison to the reforms, facilities, guarantees, and formal calls it provided, as well as the natural resources that foreign investing companies are searching for.

2. Standard analysis of the impact of economic determinants on the attractiveness of foreign investment in Algeria for the period (1970-2018).

This phase comes to translate the relationship into images of mathematical models that facilitate the carrying out of a quantitative measurement process in order to analyze the effect of positive and negative changes of the overall economic determinants on the attractiveness of FDI in Algeria for the period (1970-2018). This stage includes the following steps:

2.1. Definition of the study variables:

Before embarking on the standard study, it is necessary to introduce the variables of the model, as all theories agree that the determinants affect the attractiveness of FDI, whether negatively or positively. So the study adopted the macroeconomic determinants as independent variables and FDI inflows coming into Algeria as a dependent variable. Our general model will take the following equation:

$$DFDI = f(\mathbf{FDI}(-1), \mathbf{INF}_{P(-1)}, \mathbf{INF}_{N(-1)}, \mathbf{EXC}_{P(-1)}, \mathbf{EXC}_{N(-1)}, \mathbf{GDP}_{P(-1)}, \mathbf{P}_{P(-1)}, \mathbf{P}_{N(-1)}, \mathbf{DEBT}_{P(-1)}, \mathbf{DEBT}_{N(-1)})$$

Where;

FDI: represents the FDI

INF_P(-1)، INF_N(-1): The rate of inflation (positive or negative)

EXC_P(-1)، EXC_N(-1)**:** Rate Exchange with its negative and positive variables

GDP_P(-1)،GDP_N(-1): Gross Domestic Product's Rate with its negative and positive variables

P_P(-1)، P_N(-1): Population with its negative and positive variables

DEBT_P(-1) ،DEBT_N(-1): external debt stocks with its negative and positive variables

Our practical study is based on its data published by the statistics published by the World Bank data (https://data.albankaldawli.org/), and the United Nations Conference on Trade and Development (www.unctad.org/fdistatistics). The analysis is based on annual data series of the economy Algerian during the period (1970-2018), and standard quantitative methods will be used to identify the moral determinants of the size of foreign direct investment in the Algerian economy.

2.2 Study the stability of time series using unit root tests:

Before conducting the analysis that shows the effect of the macroeconomic determinants on attracting FDI Algeria, it is necessary to study the stability of time series and determine the degree of integration between them as a prerequisite in the process of building models, and the time series is stable if it fluctuated around a fixed arithmetic medium with constant variation, and from The most important famous tests to study the nature and characteristics of time series of variables under study, we find the simple Dickie Fuller test and the advanced Dickie Fuller test (ADF) which we will mainly use in research and Philips Peron test (PP) ..... in order to detect the presence of the unit root in the chains Time based on the Eviews 10 statistical software. The following table shows the results of the Time Series Stability Test (ADF):

Table1: Results of Stability Test with ADF

Variables	Augmented Dickey Fuller (Level)		Augmented Dickey Fuller (First Difference)	
	Probability value	Result	Probability value	Result
FDI	0.0030	Stationary	/	/
EXC	0.0378	Stationary	/	/
INF	0.1429	Non- Stationary	0.0000	Stationary
debt	0.2468	Non- Stationary	0.0029	Stationary
GDP	0.0000	Stationary	/	/
P	0.0298	Stationary	/	/

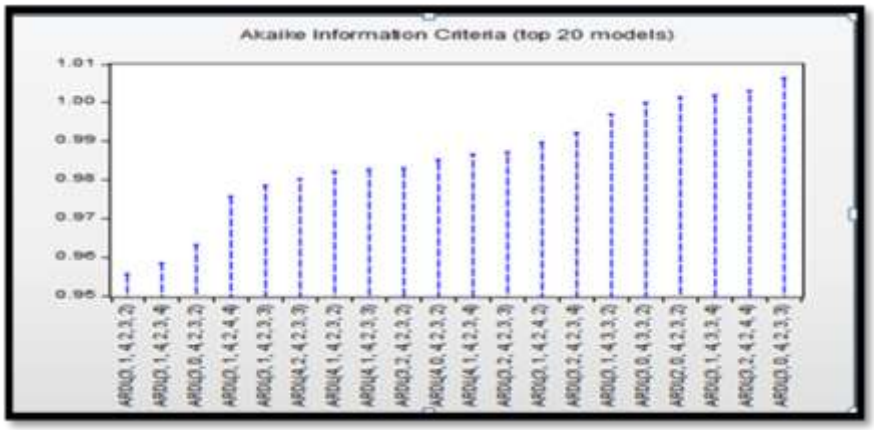
Source: Prepared by the researchers on Eviews10

The results of the time series stability test through table (01) above showed that the time series FDI flows, the exchange rate (EXC), gross domestic product (GDP) growth and population (P) are stable at the level, with a prop value is (0.0030, 0.0378, 0.0000, 0.0298) respectively and it is less than the 5% level of significance, while the rest of the time series inflation (INF) and external debt stocks settled at the first difference with a level of 5% significance, according to the Dicky Four test and it is possible to carry out an asymmetric common integration regression that shows a long-term equilibrium relationship using the NARDL method.

2.3. Determine optimal slowdowns for the NARDL model:

The length of the distributed slowdown periods (n) is determined through the use of a standard (AIC) or (SC) standard, where the length of the low AIC or SC values is tested, and according to the data relied upon in this study, the best model is NARDL (3,1,4,2,3,2) according to the (AIC) standard, as shown in the following figure

Figure 2: Results of determining the optimal time delay for a NARDL model



Source: Prepared by the researchers on Eviews10

2.4. Co-integration testing Method of Nonlinear Autoregressive Distributed Lag (NARDL):

The (NARDL) model has been recently developed by "Shin, Yu, and Greenwood-Nimmo" in 2014 (David E. Allen, 2019). It uses analyzes of positive and negative subgroups that allow the discovery of asymmetric effects in the short and long term. Compared to the classic joint integration models, NARDL models provide some other advantages as they are better used to determine integration relationships in small samples "Romilly, Song, and Liu, 2001" . Moreover, they also help to solve the multicollinearity problem by testing the appropriate delay arrangement for variables (shin et al 2014) (inceif, 2017, p. 9). They can be applied regardless of whether the stability is constant at the level I (0) or at the first difference I (1) or a combination between them (Masih, 2017), but it cannot be applied in the event that the series is stable from the second degree, and the NARDL model takes the relationship Next (Turan Taner, 2018, p. 588)

$$\Delta y_t = \mu + \rho y_{t-1} + \theta^+ x^+_{t-1} + \theta^- x^-_{t-1} + \sum_{j=1}^{p-1} \alpha_j \Delta y_{t-j} + \sum_{j=0}^{q-1} \left(\pi^+_{t-j} \Delta x^+_{t-j} + \pi^-_{t-j} \Delta x^-_{t-j}\right) + \epsilon_t$$

Where: ρ , θ^- , θ^+: represent parameters in the long run, $\emptyset_i$, π_i^- , π_i^+: represent parameters in the short term.

After estimating the NARDL model, the presence of co-integrations between the variables is tested using Fischer F-test, where F is compared to the two critical values of the limits test set by Pesaran et al (2001) if the F statistic is higher than the upper critical value we reject the null hypothesis, and we accept the alternative hypothesis i.e. There is an integration between the variables (Khalid M. Kisswani, 2017), according to the following two hypotheses:

Null hypothesis: $H_0: \rho = \theta^- = \theta^+ = 0$ (no common integration).

Alternative hypothesis: $H_1: \rho \neq \theta^- \neq \theta^+ \neq 0$ (co-integral)

An additional test, the NARDL's style is characterized by an additional test which is the symmetry test in the long-term, where the following null hypothesis is tested, using the Wald test:

$$\left(\beta^+ = -\frac{\theta^+}{\rho}\right) = \left(\beta^- = -\frac{\theta^-}{\rho}\right)$$

Conversely, the alternative hypothesis which states the asymmetrical relation between the studied variables as follows:

$$\left(\beta^+ = -\frac{\theta^+}{\varrho}\right) \neq \left(\beta^- = -\frac{\theta^-}{\varrho}\right)$$

2.4.1.Results of NARDL Model Estimation:

Through the application of applying the Method of Nonlinear Autoregressive Distributed Lag (NARDL) after ensuring that time series are not integrated from the second degree as well as creating positive and negative chains for the determinants of FDI, the regression can be made between these determinants and FDI flows in Algeria for the period (1970-2018). We obtained the following results according to Appendix No 1 which are summarized in the following table:

Table 2: Results of estimating long-term parameters, results of NARDL model estimation test

variable	coefficient	Sts.Error	t-Statistic	prob
C	17.40	1.90	9.12	0.0000
fdi(-1)	-1.24	0.08	-15.12	0.0000
inf_p(-1)	-0.17	0.02	-7.28	0.0001
inf_n(-1)	-0.11	0.02	-4.24	0.0028
exc_p(-1)	0.04	0.008	5.71	0.0004
exc_n(-1)	0.38	0.09	4.26	0.0027
gdp_p(-1)	-0.10	0.036	-2.97	0.0178
gdp_n(-1)	-0.16	0.058	-2.86	0.0211
p_p(-1)	6.73	1.9	3.46	0.0085
p_n(-1)	-2.96	0.66	-4.44	0.0021
debt_p(-1)	0.03	0.013	2.42	0.0414

debt_n(-1)	-0.04	0.013	-3.55	0.0075
DFDI = 17.40506151 - 1.24281733596*FDI(-1) - 0.17180807765*INF_P(-1) - 0.112024823653*INF_N(-1) + 0.0458783647764*EXC_P(-1) + 0.385157728148*EXC_N(-1) - 0.109720463719*GDP_P(-1) - 0.167303061883*GDP_N(-1) + 6.73896484234*P_P(-1) - 2.96993325495*P_N(-1) + 0.0322684513303*DEBT_P(-1) - 0.049401959478*DEBT_N(-1)				
R2=0.9954				
F-statistic=49.15 / prob(F-statistic)=0.000002				

Source: Prepared by the researchers on Eviews10

After reading the previous results, the estimated model can be evaluated as follows:

A-Statistical evaluation of the model:

-The value of the coefficient of determination, which indicates that the independent variables explain and clarify the FDI flows of a 99.54%, which is a very strong and statistically acceptable percentage.

-Fischer test (F-statistic = 49.15) showed that the model as a whole is statistically significant, based on the prob (F-statistic) value of 0.000002 on the significance of the model as a whole.

- In addition to the value of R2 (0.9954) <DW (3.58), this necessitates rejecting the possibility of the regression being false

B- Economic evaluation of the model:

Given the results obtained from testing the long-term relationships between determinants and FDI flows to Algeria for the period (1970-2018), to the existence of a relationship between the two variables in the long term, the results can be explained as follows:

- Inflation (INF): The results showed that the variable (INF) is statistically significant, whether positive or negative changes at the level of significance 5% according to t-statistic, and the same results also indicated an inverse relationship between positive changes of inflation rates and FDI inflows by a factor 0.17-, that is, an increase in inflation rates by 1% leads to a decrease in FDI flows by 17% in the long term, which is consistent with the economic theory. The parameter, therefore, FDI inflows are affected by the positive (increases) and negative changes (decreases) of inflation rates in the long run.
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- The exchange rate (EXC): The same results above indicate that the exchange rate variable is statistically significant, whether positive or negative changes at the 5% level of significance according to t-statistic, and to record a positive correlation between positive changes and the size of FDI flows as the increase of positive changes of the variable by 1% lead to an increase in the size of FDI in Algeria by 4%, because the rise in the exchange rate is a decrease in the value of the local currency, while a positive correlation was recorded in the case of negative changes in exchange rates and the size of flows, i.e. when the exchange rate fell By one unit it will cause the flows to rise by 38%, which is not consistent with the logic of the economic theory.

- Gross Domestic Product (GDP): The results showed that the variable of GDP growth with positive and negative changes is statistically significant at the level of 5%, according to the t-statistic test, and to record an inverse relationship between the positive changes of the variable and FDI flows this relationship opposition to the concepts of economic theory. While an inverse relationship was recorded between foreign investment flows to Algeria and negative changes in GDP growth, as a decrease of 1% of GDP growth will lead to a decrease in the size of flows by 16%, and this is consistent with the economic theory.
- Population (P): The results also showed that the population variable with positive and negative changes is statistically significant at the level of 5%, according to the t-statistic test and to record a direct relationship with the size of direct investment flows and positive changes, this result is consistent with the concepts of economic theory , which indicates in its literature that any increase in population density will be a factor in attracting foreign investment, as an increase in population density with positive changes by 1% leads to an increase of 673% in the size of FDI, while decreases in the population will lead to a decrease in the level of FDI flows. This result is consistent with economic theory.
- External Debt Balances (DEBT): The same results above indicated that a variable (DEBT) with positive changes is statistically significant at a 5% level of significance according to the t-statistic test and to record a direct correlation between positive changes of external debt stocks and flows, while the results showed that an inverse relationship between negative changes in external debt stocks and FDI flows. These results are not in line with the logic of economic theory, as the increase in the size of external debt by 1% will lead to an increase of 3.2% in the volume of flows. This rise in the size of foreign debt reflects the fragility of the national economy, its weak growth, its dependency abroad, the level of trade and budget deficits, etc. All these indicators and their implications lead to the flight of existing foreign investments and refrain from the flow of new foreign investments.

2.4.2.NARDL Joint Integration Test Results:

The integration test requires a special type of test called the Wald test which is based on the following two hypotheses:

H0 **:** c(2)=c(3)=c(4)=c(5)=c(6)=c(7)=c(8)=c(9)=c(10)=c(11)=c(12) =0 there is no common integration

H1:c(2)≠c(3)≠c(4)≠c(5)≠c(6)≠c(7)≠c(8)≠c(9)≠c(10)≠c(11)=c(12)≠ 0 there is a common integration

The following table represents the results of the NARDL joint integration test:

Table 3: Non-linear joint integration test results

Wald Test			
Test statistic	Value	dt	probability
F-Statistic	35.66323	(11,8)	0.0000
Chi-square	392.2955	11	0.0000

Source: Prepared by the researchers based on Appendix (2)

Through the reading of the results of the test, we find that the probability value of the F-Statistic test of 0.0000 is less than 0.05, and therefore we reject the null hypothesis and accept the alternative hypothesis of

an asymmetry, that is, the positive and negative changes of the overall economic determinants have an asymmetric effect on FDI flows in the long run.

2.4.3.Asymmetry test results:

This test is based on the acceptance of non-acceptance of the idea of symmetry in the effect, meaning whether the effects of positive and negative chains of macroeconomic determinants equally affect in the long term on FDI flows in Algeria during the period studied or not? This is what drives us to test the following two hypotheses:

H0:-c(3)/c(2)=-c(4)/c(2)=-c(5)/c(2)=-c(6)/c(2)=-c(7)/c(2)=-c(8)/c(2)=-c(9)/c(2)=-c(10)/c(2)=-c(11)/c(2)=-c(12)/c(2)
There is not asymmetry in the relation

H1:-c(3)/c(2)≠-c(4)/c(2)≠-c(5)/c(2)≠-c(6)/c(2)≠-c(7)/c(2)≠-c(8)/c(2)≠-c(9)/c(2)≠-c(10)/c(2)≠-c(11)/c(2)≠-c(12)/c(2)
There is an asymmetry in the relation

The following figure shows the test results:

Table 4: Asymmetry test results

Wald Test			
Test statistic	Value	dt	probability
F-Statistic	25.37676	(9.8)	0.0001
Chi-square	228.3909	9	0.0000

Source: Prepared by the researchers based on Appendix (3)

Through the reading of the results of the test, we find that the probability value of the F-Statistic test of 0.0000 is less than 0.05, and therefore we reject the null hypothesis and accept the alternative hypothesis of an asymmetry, that is, the positive and negative changes of the overall economic determinants have an asymmetric effect on FDI flows in the long run.

2.5.Model Diagnosis:

In order to ensure the good quality of the model used in economic analysis and that it is free from standard problems by conducting several diagnostic tests that reveal the presence of statistical problems or not, important and most common tests have been tested, namely:

2.5.1. The test of normal distribution of randomness errors:

To verify the condition to follow the remaining model residue (Jarque-Bera) was used, and the test results are shown in the table below:

Table 5: Natural Distribution Test for Random Errors

The test	Results	
Natural Distribution Test for Random Errors	Prob	Jarque-Bera
	0.246498	2.800803

Source: Prepared by the researchers based on Eviews 10 Program

The normal distribution test for random errors showed that the probability of Jarque-Bera is 0.246498 which is greater than the level of significance (5%), which leads us to accept the null hypothesis that the residues are naturally distributed.

2.5.2. Contrast Instability Test:

In order to verify that the model does not have a contrast inconsistency problem, the ARCH test is used for this purpose, and the results are shown in the following table:

Table 6: Contrast Instability Test

The test	Results			
Contrast Instability Test	F-statistic	Prob.F	Obs*R-squared	Prob.chi- squared(1)
	39.15	0.0000	21.22	0.0000

Source: Prepared by the researchers based on Eviews 10 Program

The instability contrast test indicates that Fischer's probability is 0.0000 which is less than the level of significance (5%), which takes us to reject the null hypothesis that the variance is consistent.

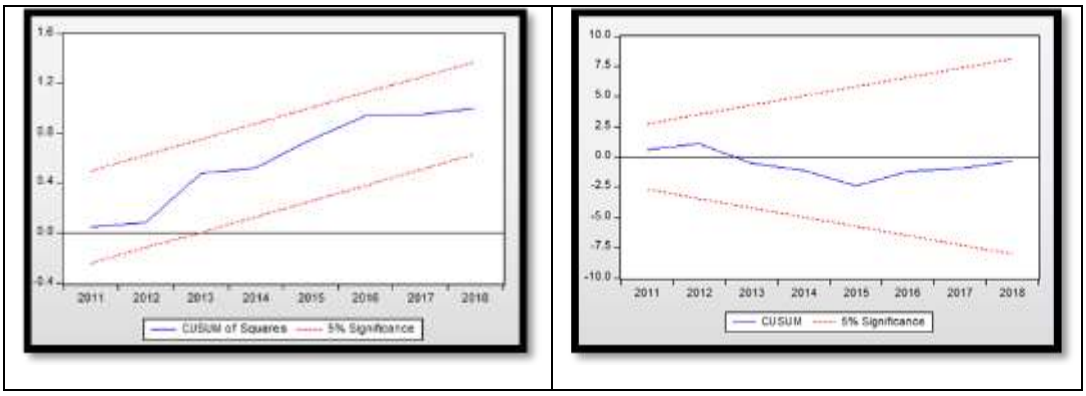
In summary of the above diagnostic tests, it can be said that the model is generally statistically significant, which proves the validity of the model and the safety of taking the model to explain the studied phenomenon.

2.6. Structural stability test of the estimated NARDL model:

The structural stability test for short and long-term transactions is the absence of data used in this study from the presence of any structural changes in it over time. To achieve this, two tests are used: the CUSUM and the (CUSUMSQ) (M.Kalaivani, 2013), and the structural stability of the estimated coefficients is achieved if the CUSUM and CUSUMSQ statistic graphs fall within the critical limits at the 5% level of significance, and then these coefficients are unstable if the graphical diagram for the statistics of the two mentioned tests moves out of the boundaries at this level.

Table 7: Structural Stability Test of the NARDL Model

(CUSUMSQ) Test	(CUSUM) Test



Source: Prepared by the researchers based on Eviews 10 Program

It is evident from the two figures that the estimated coefficients for the estimated NARDL model are structurally stable throughout the period under study, which confirms the existence of stability between the study variables, due to the graphic figure of the two statistics mentioned for this model within the critical limits at the level of significance of 5%.

3. Conclusion:

Through this study, joint integration was used according to Method of Nonlinear Autoregressive Distributed Lag (NARDL) to study the nature of the relationship between macroeconomic indicators and the attractiveness of foreign direct investment in Algeria for the period (1970-2018), and we have come out with the following results:

1- The Algerian government has endeavored to improve its investment environment by adopting a number of reforms in order to attract FDI and increase its share out of it. These reforms allowed correct economic balances and macroeconomic indicators, the latter helped to enhance economic openness and attract FDI to Algeria in as it was almost non-existent prior to these reforms.

2- Despite the improvement of the macroeconomic indicators, which are among the most important basic factors determining the flow of FDI, however, the statistical data showed that Algeria's share of FDI flows remains weak. Hence, the foreign investment did not reach the required level.

3- Through the standard study, the results of the tests showed:

- There is a short and long-term balance relationship between the macroeconomic determinants and FDI inflows in Algeria during the studied period, using the joint integration test according to Method of Nonlinear Autoregressive Distributed Lag (NARDL).
- The existence of asymmetry (asymmetry) between the macroeconomic determinants, with its negative and positive effects on FDI flows in Algeria during the studied period.

4- The Algerian economy is still suffering from a decrease in the volume of FDI flows, because the latter is restricted to very specific sectors, such as oil, which is considered as the largest sector that attracts foreign investment.

5- By studying the developments of FDI flows during the period (1970-2017) we can see that the value of investments carries the negative value during the years 1982 and 2015, which is considered as the worst outcome in the field of FDI, which reflects the reluctance of investors on the Algerian destination due to lack of clarity in the field of changing legislation and laws.

6- FDI contributes to the advancement of the national economy by providing it with sources of financing, human resource development and technology transfer.

Based on the findings of this study, the following suggestions and recommendations can be made:

- Continuous interest in creating the appropriate investment climate to attract foreign capital, which in turn provides the necessary financing for economic development.
- Adherence to a clear and long-term policy on encouraging foreign investment in order to avoid fluctuations in foreign investment inflows to Algeria during the period under consideration.
- The necessity to encourage and open facilities for foreign investors in all economic sectors of all kinds, in order to benefit from international expertise and technology and reduce.
- The need to encourage FDI, by mixing financial, trade and monetary policy.

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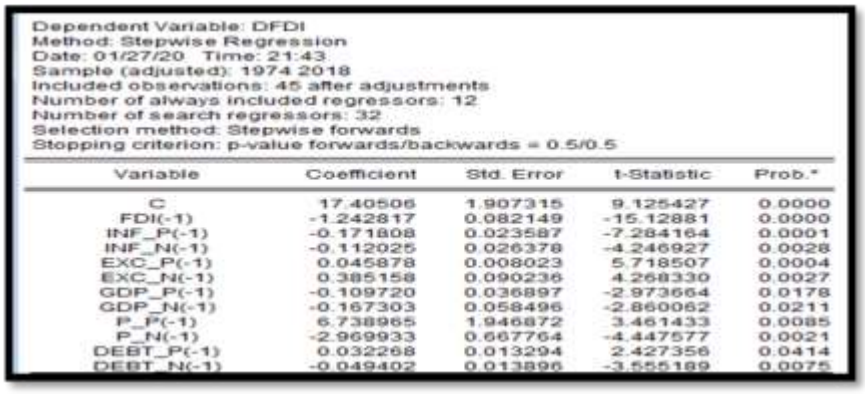
5. Appendices:

Appendix 1: Term Parameters Results of the Estimation Test



Dependent Variable: DFDI
Method: Stepwise Regression
Date: 01/27/20 Time: 21:43
Sample (adjusted): 1974 2018
Included observations: 45 after adjustments
Number of always included regressors: 12
Number of search regressors: 32
Selection method: Stepwise forwards
Stopping criterion: p-value forwards/backwards = 0.5/0.5

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
C	17.40506	1.907315	9.125427	0.0000
FDI(-1)	-1.242817	0.082149	-15.12881	0.0000
INF_P(-1)	-0.171808	0.023587	-7.284164	0.0001
INF_N(-1)	-0.112025	0.026378	-4.246927	0.0028
EXC_P(-1)	0.045878	0.008023	5.718507	0.0004
EXC_N(-1)	0.385158	0.090236	4.268330	0.0027
GDP_P(-1)	-0.109720	0.036897	-2.973664	0.0178
GDP_N(-1)	-0.167303	0.058496	-2.860062	0.0211
P_P(-1)	6.738965	1.946872	3.461433	0.0085
P_N(-1)	-2.969933	0.667764	-4.447577	0.0021
DEBT_P(-1)	0.032268	0.013294	2.427356	0.0414
DEBT_N(-1)	-0.049402	0.013896	-3.555189	0.0075

Results of Long Estimation NARDL Model

Appendix 2 : Results of the non-linear common integration test

Wald Test:
Equation: EQ01

Test Statistic	Value	df	Probability
F-statistic	35.66323	(11, 8)	0.0000
Chi-square	392.2955	11	0.0000

Null Hypothesis: C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=C(8)=C(9)=C(10)=C(11)=C(12)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	-1.242817	0.082149
C(3)	-0.171808	0.023587
C(4)	-0.112025	0.026378
C(5)	0.045878	0.008023
C(6)	0.385158	0.090236
C(7)	-0.109720	0.036897
C(8)	-0.167303	0.058496
C(9)	6.738965	1.946872
C(10)	-2.969933	0.667764
C(11)	0.032268	0.013294
C(12)	-0.049402	0.013896

Appendix 3: Results of the asymmetry test

Wald Test:
Equation: EQ01

Test Statistic	Value	df	Probability
F-statistic	25.37676	(9, 8)	0.0001
Chi-square	228.3909	9	0.0000

Null Hypothesis: -C(3)/C(2)=-C(4)/C(2)=-C(5)/C(2)=-C(6)/C(2)=-C(7)/C(2)=-C(8)/C(2)=-C(9)/C(2)=-C(10)/C(2)=-C(11)/C(2)=-C(12)/C(2)
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
-C(3)/C(2) + C(12)/C(2)	-0.098491	0.022945
-C(4)/C(2) + C(12)/C(2)	-0.050388	0.027236
-C(5)/C(2) + C(12)/C(2)	0.076665	0.016393
-C(6)/C(2) + C(12)/C(2)	0.349657	0.087578
-C(7)/C(2) + C(12)/C(2)	-0.048534	0.030451
-C(8)/C(2) + C(12)/C(2)	-0.094866	0.052751
-C(9)/C(2) + C(12)/C(2)	5.462079	1.712362
-C(10)/C(2) + C(12)/C(2)	-2.349928	0.533779
-C(11)/C(2) + C(12)/C(2)	0.065714	0.013992