

# THE EFFECT OF FOREIGN TRADE LIBERALIZATION ON THE FOREIGN DIRECT INVESTMENT INFLOWS FOR ALGERIA ECONOMETRIC STUDY USING ARDL MODEL DURING THE PERIOD (1994-2019)

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## ABSTRACT

*This study aims to analyze and diagnose the effect of foreign trade liberalization on the foreign direct investment (FDI) inflows for Algeria during the period between (1994-2019), autoregressive distributed lag model (ARDL) was applied. The results of this study indicate that on short run there is a negative impact of trade openness on FDI inflows for Algeria, owing to instability of investment environment in terms of the sudden changes in investment laws in Algeria, but on long run there is a positive relationship between trade openness and FDI inflows, because of the prominent contributor of Algeria's exports value is hydrocarbon sector (HS), where multinational corporations (MNC) possess at least 49% of HS share. Although this positive relationship but the trade openness was in favor of imports at the cost of FDI inflows, and that it seemed clear through the weakness of FDI inflows value for Algeria, and the continuous growing of Algeria's imports value.*

**Keywords:** Foreign Trade Liberalization, Foreign Direct Investment, Co-Integration, ARDL Model, Algeria.

**JEL Classification:** F13, E20, C32.

## INTRODUCTION

After 1989, Algeria's economy has experienced deep transformations through structural economic reforms which were taken by Algeria under the supervision of the International Monetary Fund (IMF). One of these economic reforms is the liberalization of foreign trade to promote exports and reduce imports on the one hand, and to encourage the foreign direct investment inflows to Algeria on the other hand, also to rebuild the foreign exchange reserve as well as achieving economic and financial equilibriums. Algeria's export value has increased from 44.43 US billion dollars in 1994 to 49.881 US billion dollars in 2019, as well as Algeria's imports value has increased from 18.63 US billion dollars in 1994 to 56.272 US billion dollars in 2019, also the foreign direct investment inflows to Algeria have increased from zero US million dollars in 1994 to 1382 US million dollars in 2019. It appears from the first glance that there is an improvement on our national economy situation, but when we compare the value of these variables, we find that the value of foreign direct investment inflows to Algeria has increased with 1.382 US billion dollars from 1994 to 2019 while Algeria's balance trade value has decreased from 25.8 US billion dollars to -6.391 US billion dollars, which means that the Algerian economy has lost an important value is estimated with 32.191 US billion dollars at the same time. The importance of this study lies in the diagnosis of the success of Algeria's foreign trade liberalization policies in attracting foreign direct investment to encourage its economic growth.

From the above, we are faced with the following problem: what is the impact of foreign trade liberalization on the foreign direct investment inflows to Algeria?

To answer this questioning and investigate the relationship between trade liberalization and foreign direct investment inflows for Algeria, we have used descriptive approach to analysis the developments of these variables, also we have used econometric approach to study this phenomenon using mathematics methods as autoregressive distributed lag model (ARDL) and evIEWS10. Study's data are a time series from 1994 to 2019, which was obtained from the United Nations Conference on Trade and Development (UNCTAD) database, and the World Bank (WB) database. Study's variables are broken into dependent variable and explanatory variables, the first variable is the foreign direct investment inflows to Algeria as a ratio of real gross domestic product (FDIY), the second variables are trade openness index (TO) as a proxy for trade freedom score and the real growth rate (GY).

Among the previous studies that addressed some aspect of this topic:

1. Study of Qamar et al. (2018) indicated that increasing trade openness in India, Iran and Pakistan increases the FDI inflow in the short-run and as well as in the long-run.
2. In our study we found increasing trade openness in Algeria leads to increase the FDI inflows only on the long-run.
3. Study of Kunofiwa (2015) has found that there is no long run relationship between FDI and trade openness in Zimbabwe.
4. The results in our study show that there is a long relationship between FDI and trade openness in Algeria.
5. The results of the study of Khan & Qazi (2014) have indicated that trade openness along with real interest rate, negatively affect the inflow of FDI in Pakistan.
6. In our study we have concluded that there is a negative impact of trade openness on FDI inflows only on short-run.

This research paper is organized as follow:

Section 1 presents some Literature review. Section 2 we introduce a brief overview of trade liberalization and foreign direct investment. Section 3 contains methods and material applied. Section 4 contains the results of econometric and empirical study. Section 5 contains discussion, in this section we examine the robustness of the results in section 4, and finally in section 6 we present the conclusion

## LITERATURE REVIEW

### Trade Liberalization

Economists have presented various definitions. According to Elizabeth (2006: 10) Trade liberalization policies are "*policies that allow the unrestricted flow of goods and services*", Hasan (2016: 25) has defined Trade liberalization as the process of removing government controls on trade terms, enabling the opening of domestic markets and the assimilation into the international market.

### Trade Freedom Score

Trade freedom is a composite measure of the extent of tariff and nontariff barriers that affect imports and exports of goods and services . The trade freedom score is based on two inputs:

1. The trade-weighted average tariff rate and
2. Non tariff barriers (NTBs) (Heritage, 2014: 477).

The base trade freedom score using the following equation:

$$\text{Trade Freedom}_i = (((\text{Tariff}_{\max} - \text{Tariff}_i) / (\text{Tariff}_{\max} - \text{Tariff}_{\min})) * 100) - \text{NTB}_i$$

Where:

Trade Freedom<sub>i</sub> is the trade freedom in country i

Tariff<sub>max</sub> is the upper bounds for tariff rates (%)

Tariff<sub>min</sub> is the lower bounds for tariff rates (%)

Tariff<sub>i</sub> is the weighted average tariff rate (%) in country i.

NTB<sub>i</sub> is the penalty which subtracted from the base score of country i, this penalty ranges from 5 to 20 points. (Heritage, 2019: 465).

According to Heritage Foundation Company the trade freedom index is divided into five sub- categories: from 0 to 49.9 point repressed, from 50 to 59.9 point mostly unfree, from 60 to 69.9 point moderately free, from 70 to 79.9 point mostly free and from 80 to 100 point free (Heritage, 2021).

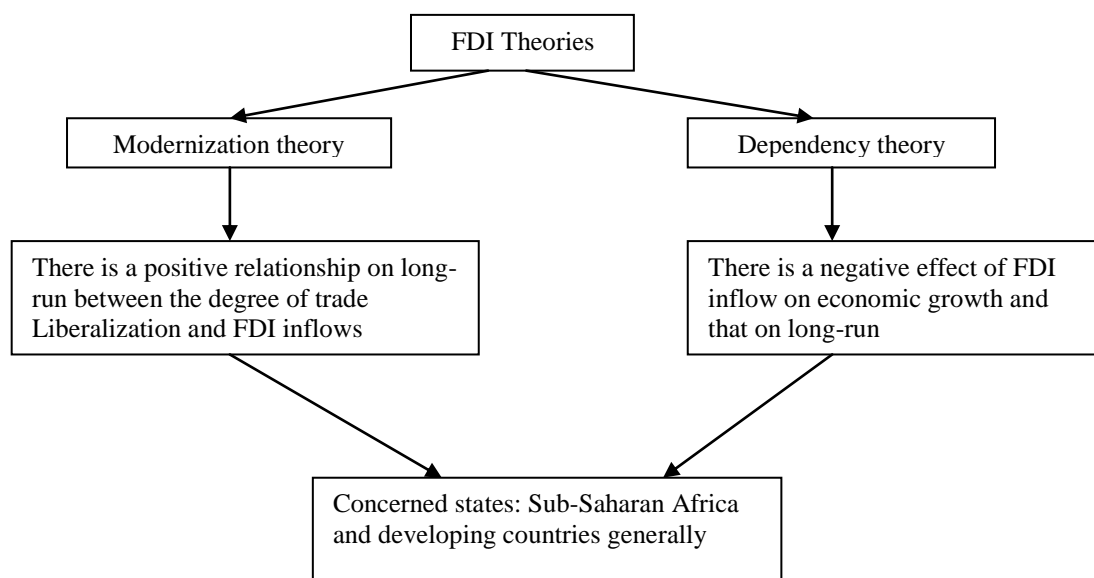
### Foreign Direct Investment

Foreign direct investment (FDI) is very important especially at the level of developing countries as Algeria, because it creates added value, the economists have been contributing since 1960 to define FDI by several theories, which was summarized in the below Table 1.

Table 1 TRADITIONAL THEORIES OF FOREIGN DIRECT INVESTMENT		
Theory	Contributor	Explanation
Monopolistic	Hymer (1960)	multinational corporations (MNC) must possess monopolistic advantages to outweigh the disadvantages faced in competing with indigenous firms of the host country
International Product - Life cycle	Vernon (1966) Wells (1972)	The ability of MNC depends on its technological capability to introduce a new product in the market
Financial	Aliber (1970)	FDI can arise if the source country firm has an advantage in financing the capital over host country firms
Macroeconomic	Kojima (1973) Ozawa (1979)	FDI should originate from the home country's comparatively disadvantaged industry to the comparatively advantaged industry in the host country
Internalization	Buckley & Casson (1976) Hennart (1982)	to obtain a higher return on their investment, MNC will transfer their knowledge to foreign subsidiaries and then sell it on the open market.
Eclectic Paradigm	Dunning (1977)	FDI can arise when MNC have ownership, location, and internalization advantages.

Source: (Mahboubul, 2000: 63)

Besides these traditional theories of FDI, there are also two theories, which were illustrated in the following Figure 1.



Source: (Hasan, 2016: 66)

**Figure 1**  
**THEORIES OF FOREIGN DIRECT INVESTMENT (FDI)**

**We have proposed the following hypothesis:** there is a positive relationship between the degree of trade liberalization and foreign direct investment inflows to Algeria.

## METHODS AND MATERIAL

### Model Specification

In order to test the relationship between foreign trade liberalization and foreign direct investment inflows into Algeria, we have used The Autoregressive Distributed Lag model (ARDL), and that to estimate the impact on long-run and short-run. This test (ARDL) is valid whether the variables are I(0) or I(1) (Mohsen et al., Scott, 2010: 583). The model is stated as (Agiomirgianakis et al., 2016: 10):

$$FDIY = f(GY, TO) \dots \dots \dots (1)$$

FDIY is the ratio of foreign direct investment inflows (FDI) in real gross domestic product (Y), GY is the real growth rate, is measured by the ratio  $((Y_t - Y_{t-1}) / Y_{t-1}) * 100$ , where  $Y_t$  is the real gross domestic product at present period(t),  $Y_{t-1}$  is the real gross domestic product at previous period(t-1), TO is the ratio of exports (X) and imports (M) value in real gross domestic product.

$$GY = ((Y_t - Y_{t-1}) / Y_{t-1}) * 100$$

Trade Openness (TO) =  $((\text{Exports} + \text{imports}) / Y)$  (Malhotra & Kumari, 2017: 36). The generalized ARDL (p, q) model is specified as:

$$Y_t = \gamma_{0i} + \sum_{i=1}^p \delta_i Y_{t-1} + \sum_{i=0}^q B^1 X_{t-1} + \varepsilon_{it}$$

Where:

$Y_t$  = vector (meaning each variable can be used as the dependent variable).

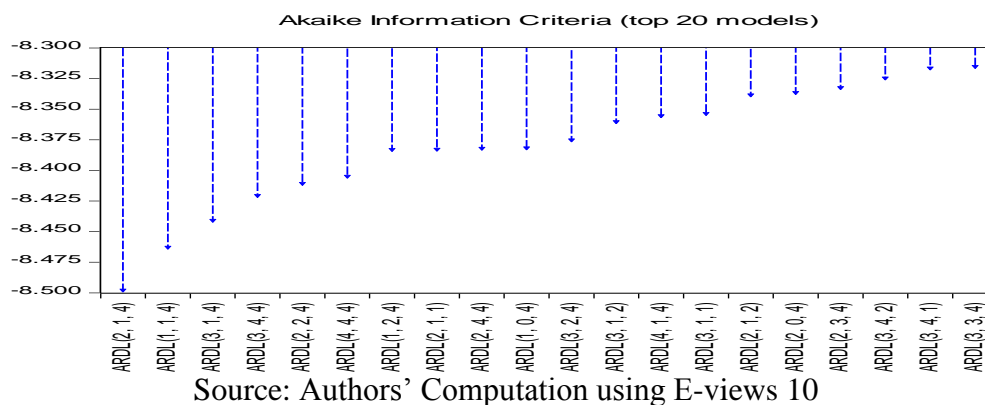
$X_t$  = the variables allowed to be stationary at an absolute level or after first difference or cointegrated.

$B$  and  $\delta$  = Coefficients.

$\gamma$  = the constant or the intercept.

$i$  = ranges from 1 to  $k$ , and it typifies the number of variables in the model.

$\varepsilon_{it}$  = vector of the error terms which is serially uncorrelated (Kemboi et Martine, 2020: 138).



**Figure 2**  
**TOP20 MODELS SELECTED BY AKAIKE CRITERIA**

To select the preferred ARDL model it should determine the optimum lag length by using the Akaike Information Criterion (AIC), with the smallest value (Nkoro and Kelvin, 83: 2016). According to Akaike information criteria (see Figure 2) the preferred ARDL model which was selected is ARDL (2, 1, 4).

The econometric form of equation (1) is stated as:

$$\Delta FDIY = \alpha_0 + \alpha_{1i} \cdot \sum_{i=1}^{n_0} \Delta FDIY_{t-1} + \alpha_{2i} \cdot \sum_{i=0}^{n_1} \Delta GY_{t-i} + \alpha_{3i} \cdot \sum_{i=0}^{n_2} \Delta TO_{t-i} + B_1 \cdot FDIY_{t-1} + B_2 \cdot GY_{t-1} + B_3 \cdot TO_{t-1} + \varepsilon_t$$

Where:

$B_1$ ,  $B_2$  and  $B_3$  are coefficients of the long-run parameters

$\Delta$  is the first difference operator

$t - 1$  is the lag order selected by Akaike's Information Criterion (AIC) (Justin and Sebastian, 2020: 36).

## Data Source

Data on foreign direct investment inflows was sourced from the United Nations Conference on Trade and Development (UNCTAD) database with US dollars at current prices in millions. Data on other variables: real gross domestic product (Y), exports (X) and imports (M) were sourced from the World Bank (WB) database. Y, X and M were taken with US dollars at constant prices 2010 in billions. FDI was taken with US dollars at current prices in millions.

## RESULTS

<b>Table 2</b> <b>ALGERIA'S TRADE OPENNESS INDEX DURING THE PERIOD (1994-2019) (UM: US BILLION \$)</b>					
Year	Exports (X)	Imports (M)	Real GDP (Y)	(X+M)	(X+M)/Y
1994	44.43	18.63	89.762	63.06	0.70
1995	47.229	19.003	93.173	66.232	0.71
1996	50.771	16.475	96.993	67.246	0.69
1997	53.969	16.871	98.06	70.84	0.72
1998	54.887	18.102	103.062	72.989	0.71
1999	58.183	18.409	106.359	76.592	0.72
2000	61.885	19.803	110.401	81.688	0.74
2001	60.362	21.954	113.713	82.316	0.72
2002	62.803	26.886	120.081	89.689	0.75
2003	68.1	28.23	128.727	96.33	0.75
2004	70.189	31.695	134.262	101.884	0.76
2005	74.218	33.696	142.184	107.914	0.76
2006	72.258	33.193	144.601	105.451	0.73
2007	71.506	37.2	149.517	108.656	0.73
2008	69.461	42.929	153.106	112.39	0.73
2009	62.49	48.514	155.555	111.004	0.71
2010	61.955	50.638	161.155	112.593	0.70
2011	60.088	47.9	165.829	107.988	0.65
2012	57.816	54.572	171.467	112.388	0.66
2013	54.52	59.92	176.268	114.44	0.65
2014	54.629	64.954	182.966	119.583	0.65
2015	54.902	69.435	189.736	124.337	0.66
2016	58.746	67.491	195.808	126.237	0.64
2017	55.162	62.699	198.353	117.861	0.59
2018	53.121	60.442	200.733	113.563	0.57
2019	49.881	56.272	202.339	106.153	0.52

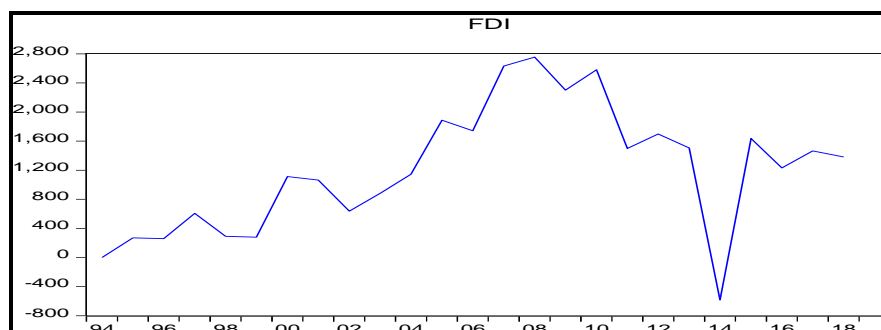
Source: World Bank Open Data, 2021

Table 2 shows that Algeria's imports value experienced generally continuous growing, its value has passed from its lowest value 18,63 US billion dollars in 1994 to highest value (the peak) at 69.435 in 2015, which represents growth with 272,7%, while the exports value experienced weakness and fluctuation of its value, which ranged between 44.43 US billion dollars in 1994 and 74.218 US billion dollars in 2005, after this year exports value experienced generally continuous deterioration in its value until 2019, which recorded 49,881 US billion dollars, the value of this deterioration was evaluated at 24.337 US billion dollars.

<b>Table 3</b> <b>EVOLUTION OF FOREIGN DIRECT INVESTMENT INFLOWS TO ALGERIA OVER THE PERIOD (1994-2019) (UM: US MILLION \$)</b>							
Year	FDI	Year	FDI	Year	FDI	Year	FDI
1994	0	2001	1113	2008	2632	2015	-585
1995	0	2002	1065	2009	2754	2016	1636
1996	270	2003	638	2010	2301	2017	1232
1997	260	2004	882	2011	2581	2018	1466
1998	607	2005	1145	2012	1499	2019	1382
1999	292	2006	1888	2013	1697		
2000	280	2007	1743	2014	1507		

Source: (UNCTAD, 2021)

From Table 3 and Figure 3 we have remarked that the value of FDI inflows for Algeria has remained weak compared to the peak 2,754 US billion dollars which was recorded only in 2009. Through this analysis we concluded that the trade openness was in favor of imports at the cost of both exports and FDI inflows.



Source: Authors' preparation using E-views 10 based on Table 3 data

**Figure 3**  
**EVOLUTION OF FOREIGN DIRECT INVESTMENT INFLOWS TO ALGERIA DURING THE PERIOD (1994-2019)**

### Stationary Test of Time Series

<b>Table 4</b>						
<b>AUGMENTED DICKEY FULLER UNIT ROOT TEST</b>						
Without Trend and Intercept						
	Level			First Difference		
Variables	t-statistics	t-criticals	Status	t-statistics	t-criticals	Status
FDIY	-1.082350	-1.955020	non- stationary	-7.179917	-1.955681	Stationary
GY	-0.863037	-1.955681	non- stationary	-8.937732	-1.955681	Stationary
TO	-1.468459	-1.966270	non- stationary	3.777683	-1.968430	Stationary

Source: Authors' Computation using E-views 10

The results of Tables 4 to 9 indicate that all time series are stationary at the first difference.

### Bounds Test

<b>Table 5</b>			
<b>ARDL BOUNDS TEST</b>			
F-Bounds Test			
F-Value	Signif.	I(0)	I(1)
5.982025	10%	2.63	3.35
	5%	3.1	3.87
	2.5%	3.55	4.38
	1%	4.13	5

Source: Authors' Computation using E-views 10

<b>Table 6</b>				
<b>LONG-RUN RELATIONSHIP ARDL MODEL</b>				
Variable	Coefficient	Std. Error	t-Statistic	Prob

GY	-0.001623	0.001091	-1.487762	0.1626
TO	0.127043	0.024722	5.138778	0.0002
C	-0.076640	0.016414	-4.669163	0.0005

Source: Authors' Computation using E-views 10

### Short-Run Relationship Test

Table 7 SHORT-RUN RELATIONSHIP ARDL MODEL				
Variable	Coefficient	Std. Error	t-Statistic	Prob
D(FDIY(-1))	-0.235374	0.143672	-1.638278	0.1273
D(GY)	-0.000494	0.000365	-1.353037	0.2010
D(TO)	-0.096501	0.031778	-3.036713	0.0103
D(TO(-1))	-0.120241	0.043692	-2.751996	0.0175
D(TO(-2))	-0.082644	0.042323	-1.952667	0.0746
D(TO(-3))	-0.116819	0.040398	-2.891684	0.0135
CointEq(-1)*	-0.919418	0.168114	-5.469015	0.0001

Source: Authors' Computation using E-views 10

### Serial Correlation Test

Table 8 SERIAL CORRELATION LM TEST	
Breusch-Godfrey Serial Correlation LM Test	
F-statistic 0.367823	Prob. F(2,20) 0.7012
Obs*R-squared 1.507519	Prob. Chi-Square(2) 0.4706

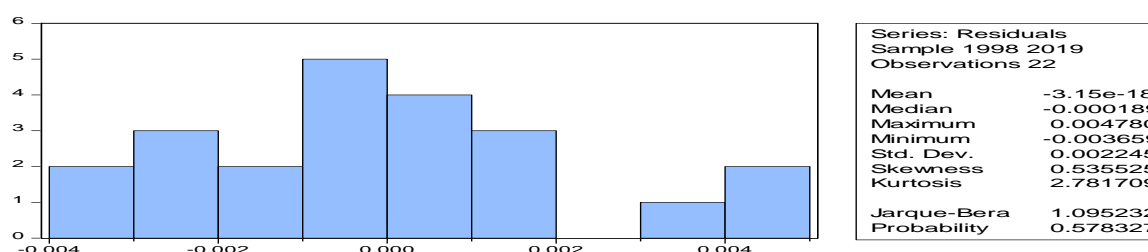
Source: Authors' Computation using E-views 10

### Heteroskedasticity Test

Table 9 HETEROSKEDASTICITY ARCH TEST	
F-statistic 0.000603	Prob. F(1,19) 0.9807
Obs*R-squared 0.000667	Prob. Chi-Square(1) 0.9794

Source: Authors' Computation using E-views 10

### Normality Test

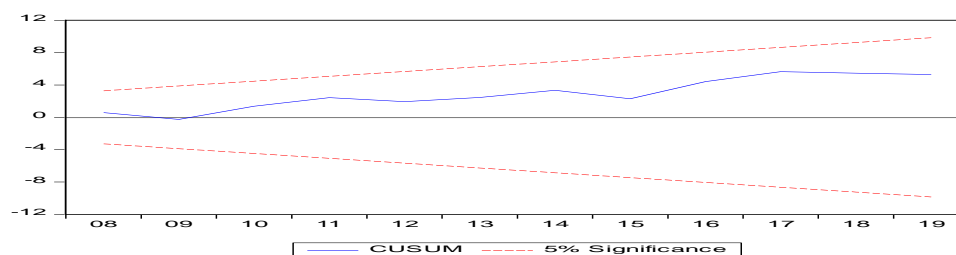


Source: Authors' Computation using E-views 10

**Figure 4**  
**NORMALITY TEST**

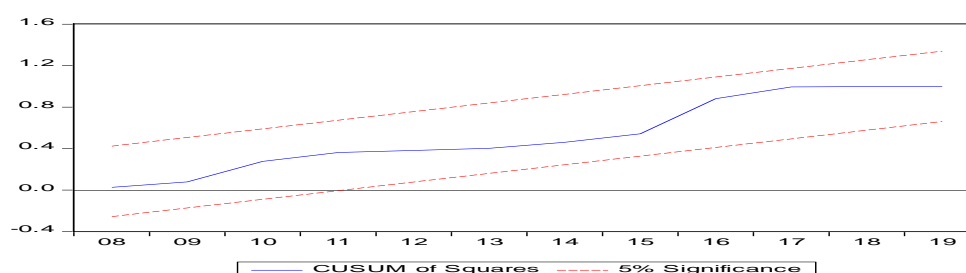


## Stability Diagnostics



Source: Authors' Computation using E-views 10

**Figure 5**  
**CUSUM TEST**



Source: Authors' Computation using E-views 10

**Figure 6**  
**CUSUM OF SQUARES TEST**

## DISCUSSION

### Stationary Test of Time Series

As a starting point, first we test the variables for a unit root. For this purpose, we use the Augmented Dickey Fuller (ADF) unit root test (Mukhtarov, 2019: 43). To test the stationary or non-stationary of the time series there is two hypotheses, null against the alternative, if calculated  $\tau$  value was upper than critical  $\tau$  value in absolute terms, alternative hypothesis of stationary is accepted and null hypothesis is rejected, while if calculated  $\tau$  value was lower than critical  $\tau$  value in absolute terms, null hypothesis of non-stationary is accepted and alternative hypothesis is rejected (Jehanzeb, 2006: 17) in Figures 4 to 6.

### Bounds Test and Long-Run Relationship

If F-statistic exceeds the critical value of the upper bound, This implies that the null hypothesis of absence of a long-run relationship is rejected and the alternative hypothesis of presence of a long-run relationship is accepted (Omorieg et Ikpesu, 2019: 92). From the outputs in table 5 we remark that the value of F-statistic (5.982025) is greater than upper critical values at 10%, 5%, 2.5% and 1% levels. This implies the existence of a long-run relationship between dependent variable (FDIY) and explanatory variables (GY and TO). On the long-run, as shown in table 6 we have remarked these following points:

The long-run equation can be written as follow:

$$FDIY = -0.076640 - 0.001623 GY + 0.127043 TO$$

## Short-Run Relationship

The relationship between GY and FDIY is negative and statistically insignificant. The trade openness (TO) has a positive significant impact on FDIY. A 1% increase for TO would increase FDIY with 0.127043%, which implies that a 1% increase for TO would lead FDI to improve with 0.00127043Y. We can explain this that the majority of foreign direct investment inward to Algeria was concentrated especially in hydrocarbon sector which represents almost all Algeria's exports value.

On the short-run, as shown in Table 7 we have remarked these following points:

The relationship between GY and FDIY is negative but statistically insignificant. The trade openness (TO) has a negative significant impact on FDIY at lag period 0, -1, and -3. A 1% increase for TO will lead FDIY to decline with 0.096501% , 0.120241% and 0.116819% at lag period 0, -1, and -3 respectively.

A 1% increase for TO will lead FDI to decline with 0.00096501 of Y , 0.00120241 of Y and 0.00116819 of Y at lag period 0, -1, and -3 respectively. The coefficient of the error correction term (-0.919418) is negative and statistically significant, which means that this model corrects its short-run disequilibrium by about 0.92% speed of adjustment in order to return to the long-run equilibrium. This highly significant error correction term is further proof that the long-run relationship is stable (Irina & Ana, 2014: 20).

The negative relationship between trade openness and foreign direct investment inflows to Algeria on short-run can be explained by the instability of investment environment in terms of the sudden changes in investment laws in Algeria.

**Serial Correlation:** If the probability value of Breusch-Godfrey Serial Correlation LM Test was greater than 5%, we accept the null hypothesis which means absence of Serial Correlation (Hui et al., 2019: 1677-1678). Through Table 8 we remark that the probability of chi-square value (0.4706) is upper than 5%, and so absence of serial correlation.

**Heteroskedasticity ARCH test:** If the probability value of the heteroskedasticity ARCH test was greater than 5%, we accept the null hypothesis which means absence of heteroskedasticity (Philip Ifeakachukwu Nwosa, 2018: 187). Through Table 9 we remark that the probability of chi-square value (0.9794) is upper than 0.05, so Absence of heteroskedasticity.

**Normality test:** If the probability value of Jarque-Bera is greater than 5%, the residuals follow the normality (Cambazoglu & Karaalp, 2014: 444). Through Figure 5 we observe that the probability value of Jarque-Bera (0.578327) is greater than 0.05, and so the residuals follow the normality.

**CUSUM and CUSUM of Square test:** the results of CUSUM (Cumulative Sum) and CUSUM of Square tests (Mili, 2019: 170) prove that the model is stable during the period from 1994 to 2019, because the figure of CUSUM and CUSUM of Square remained within critical bounds at 5% significance. From the above explanatory tests stationary, CUSUM and CUSUM of Square, we conclude that this econometric model is appropriate to economic study

## CONCLUSION

We have tried through this study to shed and highlight the relationship in both short and long run between trade liberalization and foreign direct investment inflows to Algeria, using an autoregressive distributed lag model (ARDL). We have concluded the following results:

1. Existence a long- run relationship between trade openness and foreign direct investment inflows, where a 1% increase for trade openness would increase foreign direct investment inflows to improve with 0.127043%.
2. Existence a long- run insignificant negative relationship between real growth rate and foreign direct investment inflows, which a 1% increase real growth rate would lead foreign direct investment inflows to decline with 0.001623 %. We can explain this negative relationship by illegal competition between domestic firms and multi-national corporations (MNC), these MNC have a large amount of capital, skilled which allow them to exert a huge pressure on the domestic firms, and so decline their production, and that according to dependency theory of foreign direct investment.
3. Almost all value of foreign direct investments flow was tended to the hydrocarbon sector, instead of the productive sectors, and this is demonstrated by the negative relationship between real growth rate and foreign direct investment inflows.
4. On short-run there is a significant negative relationship between trade openness and foreign direct investment inflows, this negative relationship owing to instability of the investment environment in terms of the sudden changes in investment laws in Algeria.
5. The trade openness in Algeria was at the cost of export, and this is illustrated through a continuous progressive of imports' value and the negative relationship between foreign direct investment and real growth rate.
6. The weakness of foreign direct investments' value inflows to Algeria during the period of study.
7. Fluctuation and weakness of Algeria's exports value, in return for a continuous increase of Algeria's imports value.
8. Through these results, we can offer the following recommendations:
9. Algeria's government should provide stability investment laws for many years to attract foreign investors to come to Algeria, which allow remaking its foreign exchange reserves.
10. Improving and modernizing the financial banking system, for example through encouraging e-commerce and e-payment.
11. Elimination of the illegal financial market.
12. Algeria's government has to reactivate Algeria's financial market in order to help Algeria's banks to satisfy foreign investor desires.
13. Algeria's government must reconsider the 49/51 rule investment.
14. The Algerian public authorities should accelerate to affiliate in the World Trade Organization (WTO), because the affiliation to this organization will help Algeria to attract many foreign investors, through reduction tariffs rates, also providing guarantees for them.
15. Facilitating endowment of industrial estates to foreign investors because of the time factor is very important to them.
16. Simplification and facilitation of customs and tax procedures.
17. One should activate economic diplomacy by promoting Algeria's capabilities.
18. Removing bureaucratic obstacles by focusing on digitization.

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