Factors of attractiveness of foreign direct investments (FDI) in Algeria during the period 2000 - 2022: "An empirical study using the ARCH and GARCH approach

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Abstract:

This study aims to model and identify the main determinants of foreign direct investment in Algeria during the period 2000 - 2022. For this purpose, we applied the ARCH and GARCH estimation method.

The main results of our study lead to the conclusion that there is a significant positive impact of the degree of economic openness, the schooling rate, public investment and non-hydrocarbon exports on FDI flows during the period 2000-2022. These results show that FDI could help the economic process in Algeria, which is considered a developing country. Moreover, it is beneficial for both home and host countries and is an integral part of an open and efficient international economic system and is one of the main catalysts of development.

Keywords: FDI, degree of economic openness, school enrollment, public investment, non-hydrocarbon exports, ARCH, GARCH.

JEL Classification Codes: C50, C10, E52, D20

1. INTRODUCTION

Today, investment appears to be a key factor in the development and growth of countries. More specifically, foreign direct investment (FDI), which in recent years was considered by developing countries (DCs) as an instrument used by developed countries to impose their dominance over their economies. Indeed, foreign direct investment occupies a very

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important place in the globalization of economies, as it increases competition in the industries of host countries. It is seen as a component of capital flows to developing countries and is one of the aspects of globalization (Khori, 2008).

In addition, FDI enables technology transfers, particularly in the form of new types of fixed capital inputs that financial investments or trade in goods and services cannot provide. FDI can also promote competition in the domestic input market.

For developing countries, in a context where the bulk of world trade is conducted by multinational enterprises, FDI is a means of integrating into globalization and boosting exports.

Like other countries, the role of foreign direct investment in Algeria has become essential to their economic growth thanks to the positive externalities they generate in the recipient economy.

It is within this framework that Algeria has adopted a liberal policy (liberalization of foreign trade) within the framework of the stabilization and structural adjustment program during the nineties (1994 - 1998). Thus, since the year two thousand, Algeria has established a certain reform on the one hand, encouraged more foreign direct investments to attract foreign investors and, on the other hand, improve the business environment to contribute considerably to growth. The FDI flows presented 1.31 billion dollars of net capital inflows in 2022, against 1.19 billion dollars in 2021. This improvement can be explained by the introduction of several waves of reforms, the quality of domestic capital and the dominance of the oil industry.

Algeria has attracted less Foreign Direct Investment (FDI) in 2020, according to the United Nations Conference on Trade and Development (UNCTAD) report on investment in the world. Indeed, the flow of FDI to Algeria in 2020 reached 860 million against 1.11 billion dollars in 2019, a year marked by the spread of the pandemic Covid-19.

In this context, our problematic tries to answer the following question:

- What are the different factors of FDI attractiveness in Algeria during the period 2000 - 2022?

To answer our problem, the study relies on ARCH and GARCH (AutoRegressive Conditional Heteroskedasticity) modeling to determine the different factors of attractiveness of foreign direct investments (FDI) in Algeria during the period 2000 - 2022 and to test if there is a causal relationship between FDI, degree of economic openness, the rate of schooling, public investment and export.

In order to better understand our objective, the study is organized as follows:

- The first part briefly discusses the economic and empirical literature on the conceptual framework of foreign direct investment (FDI).
- The second part is devoted to the empirical modeling of our study such as: the variables of the empirical model, the data sources of the model, the specification of the model.
- The third part presents the results and interpretation of the results of the empirical modeling with the ARCH and GARCH model.
- The fourth part consists of the verification of the validation of the ARCH and GARCH model.

2. The economic and empirical literature on the conceptual framework of foreign direct investment (FDI)

In the 1970s, foreign direct investments emerged with the globalization of economic markets. They are considered an economic phenomenon that can increase capital formation and generate technology transfer (Ndiaye, 2007).

Foreign direct investments are part of the engine of growth because they evoke the employment situation at the national level and are considered as a key engine of economic growth (Ajayi, 2006). For this reason, it can be said that foreign direct investment can contribute to growth and economic development. For their part, Tersen and Briscout (1996) point out that: "FDI is such a complex phenomenon that it is difficult to grasp all its facets, but it is dangerous to try to isolate any one of them" (Tersen & Bricourt, 1996).

The OECD has defined FDI as "an entity resident in one economy ("direct investor") acquiring a lasting interest in an entity resident in an economy other than the investor's ("direct investment enterprise").

The concept of a lasting interest implies the existence of a long-term

relationship between the direct investor and the enterprise and the exercise of significant influence over the management of the enterprise. Direct investment includes both the initial transaction between the two entities and all subsequent capital transactions between them and between affiliated enterprises, whether incorporated or not"(OECD, 2016).

Hymer (1960) distinguished between portfolio investment and direct investment. He shows that the capital arbitrage hypotheses explaining international capital movements, are at odds with the behavior of multinationals and are, thus, unable to explain the causes of FDI for three reasons.

Vernon (1966) explains FDI according to the life cycle of the product. At the beginning the product is designed in the country of origin with innovative technologies, and it is also produced for the local market. After reaching another stage of the life cycle, a certain growth and knowledge of the market, synergy, the product is exported to other countries with similar characteristics to the country of origin. When the product becomes standard and mature, labor costs become very important in the production process, and this is when firms relocate in search of low production costs.

In Krugman's (1979) model, the attractiveness of some FDI can improve if the host country has a domestic market with solvent demand. Indeed, the influx of investments into geographical areas with high demand acts as a spillover effect on the latter by improving its purchasing power (Krugman, 1979). The general equilibrium model developed by the author is supported by the results of Marshall's analysis (Marshall et al., 1971), Weber's arguments on externalities, and the Fujita, Imai and Ogawa model. Indeed, the importance of the demand that attracts firms leads to areas of industrial concentration where externalities are diffused, which Hoover distinguishes into economies of scale, location and urbanization. Thus the importance of urbanization economies in a country attracts investors to take advantage of economies of scale.

(Markusen, 1984), suggests in his model that foreign direct investment is a strategy by which multinational firms can access the markets of host countries at lower costs. This allows them to avoid transport costs and

customs tariffs (tariff jumping hypothesis), by setting up units in different countries that produce the same goods as the parent company (horizontal FDI). This model shows that the application of trade restrictions stimulates horizontal FDI, which in turn suppresses trade. In the opposite case, the free flow of goods and services will eliminate FDI. Thus, reducing tariffs and negotiating trade agreements would crowd out inward FDI flows (Markusen & Venable, 1998).

The work of Mayer and Mucchielli (1999) looked at the foreign location of multinational firms and deduced four determining factors: the demand for the goods market, the cost of production factors, the number of local and foreign firms already established there, and the synthesis of the various attraction policies pursued by local authorities. In other words, firms look for places where demand is high and production costs are low.

(Morisset 1999), in his study of the determinants of FDI in Africa, uses as variables the GDP growth rate, the illiteracy rate, the ratio of exports to GDP, an economic infrastructure variable (measured by the number of telephone lines per 1,000 people), and the ratio of urban population to total population. He finds that the most important factors are economic growth and the economic openness of countries to foreign trade (BOURI & BENMASSOUD, 2014).

(Camara, 2002) conducted a study on the determinants of foreign direct investment and emphasized the important role of trade and economic openness. The study focused on 12 emerging countries considered as FDI receiving countries "Argentina, Brazil, Chile, Colombia, Mexico, Venezuela, Korea, Indonesia, Malaysia, Philippines, Thailand and Singapore". The results show that market size and price competitiveness are the only determinants of FDI. The market size variable appears to be the most significant variable (Camara, 2002).

(Asiedu, 2003) used panel data on 22 African countries for the period 1984-2000 to empirically examine the impact of several variables, such as natural resource endowment, macroeconomic instability, FDI regulation, corruption, efficiency of legal systems and political instability on FDI flows. It found that FDI inflows are strongly influenced by natural resource endowment, good infrastructure, and a legal framework that favors FDI

inflows. Asiedu also found that macroeconomic restrictions, corruption, political instability discourage FDI flows.

(Bouoiyour 2003) analyzes the determinants of FDI flows in Morocco. He finds that market size, labor costs, the level of public investment, inflation, human capital and exports positively influence FDI flows to Morocco (BOURI & BENMASSOUD, 2014).

In their study (Dupuch & Milan, 2005) examined the determinants of European direct investment in Central and Eastern European countries (CEE). They used an approach based on panel data and covers the period 1993-1998. They found that wage cost differentials between Central and Eastern European countries (CEECs) are not a determining factor for foreign investors, unlike the wage differential between European Union (EU) countries and candidate countries. The effect of human capital appears to be sensitive to the construction of the education variable and the choice of sample, while the importance of market size, geographical proximity and the choice of privatization method help to explain European direct investment flows from Central and Eastern European countries (CEEC) (Dupuch & Milan, 2005).

P. Krugman and M. Obstfeld (2006) point out that, "FDI refers to capital flows whose purpose, for the investing firm, is to create or expand a subsidiary in a foreign country" (Krugman & Obstfeld, 2006). Moreover, for the IMF, foreign direct investment is "any equity transaction greater than or equal to 10% beyond national borders (business creation, equity investment, invested profits, inter-subsidiary borrowing" (Guerid, 2008).

(Bouri & Benmassoud, 2014) analyzed the attractiveness factors of foreign direct investments in the MENA region (Middle East and North Africa), using panel data econometrics on the data collected from 13 MENA countries, during the period 1980- 2011. The results of the econometric estimation show that the importance of market size, trade openness, infrastructure and political stability contribute to explain the foreign direct investment (FDI) flows to MENA countries (BOURI & BENMASSOUD, 2014).

(Dieumerci & Sumata, 2020) demonstrate in their study on the determinants

of FDI and its impact on economic performance in the Democratic Republic of Congo that the quality of institutions, economic openness, domestic investment and macroeconomic instability are the main determinants of FDI attractiveness. FDI positively influences economic performance in the short run, but its effects become negative in the long run (Dieumerci & Sumata, 2020).

Considering the above, it can be said that foreign direct investment (FDI) is a factor of development, it is one of the aspects of globalization and contribute to the economic growth of the country. In addition, foreign direct investment can create jobs (recruitment in subsidiaries of multinationals), knowledge transfer (increasing the stock of knowledge), access to international networks of production and distribution.

3. Empirical modeling

Since the promulgation of Law 90/10 on credit and currency, Algeria has been moving towards liberalizing its economy and promoting foreign investment. It has implemented a number of reforms aimed at attracting foreign investment and implemented from 1994 - 1998 a stabilization and structural adjustment program, under the impetus of the World Bank and the International Monetary Fund.

The flow of Foreign Direct Investment (FDI) has recorded a decline of 19%, with only 1.1 billion dollars captured in 2020 against 1,382 billion dollars in 2019. It can be explained by the Covid-19 pandemic, according to the 2021 World Investment Report of the United Nations Conference on Trade and Development (UNCTAD),

The UNCTAD report notes that the FDI captured by Algeria last year has been directed mainly to the natural resources sector. In 2020, notes the same source, Algeria has abolished the 49/51 rule governing investment except in strategic sectors such as hydrocarbons, mining ... ". While this may encourage diversification of FDI, the impact may only become apparent after a broader recovery in foreign investment," UNCTAD believes.

Moreover, UNCTAD figures show the overall weakness of the level of FDI stock on the national territory, compared to GDP. With 34.5 billion dollars in 2021 or 20.5% of GDP, this level is clearly below that observed in the African or Arab region, on average developing countries and even more

compared to that recorded more globally, at the world level. In Africa, it was 1026 billion dollars (for 37.5% of GDP) and in the Arab world, this stock was 1009 billion dollars (or 34.9% of GDP)

In our study, the empirical modeling seeks to study the main determinants of foreign direct investment (FDI) in Algeria during the period 2000 - 2022. To this end, we have built, for our empirical study, an ARCH and GARCH (AutoRegressive Conditional Heteroskedasticity) model to examine the factors of attractiveness of foreign direct investments in Algeria.

The autoregressive conditional heteroskedasticity models (ARCH), are econometric models proposed by ENGLE in 1982. They have the advantage of capturing the behavior of volatility over time. The principle proposed by ENGLE is to introduce a dynamic in the determination of volatility by assuming that the variance is conditional on the information available to us (Bera & Higgins, 1993).

3.1. Data source and study period

In our empirical analysis, the data used cover the period 2000 - 2022 and are taken from the statistical database of the International Monetary Fund (IMF).

Moreover, to highlight the factors of attractiveness of foreign direct investments in Algeria during the period 2000 - 2022, the choice of appropriate variables is necessary. To this end, the explanatory variables in our study are the degree of economic openness, the rate of schooling, public investment and exports excluding hydrocarbons. On the other hand, the explained variable is foreign direct investment.

3.2. Presentation of the econometric method

The model to be estimated to analyze the factors of attractiveness of foreign direct investments in Algeria during the period 2000 - 2022 is presented in the following form:

FDI= F (EO, INV, SER, EXP)

Where

FDI: Foreign direct investments.

INV: Public investments.

EXP: Non-hydrocarbon exports.

SER: School enrollment rate.

EO: economic openness.

The choice of variables is determined by economic theory but also by data considerations.

After having specified the economic model, it is necessary to transform it into what is called an econometric model. From our variables coded above, we obtain the following equation:

FDI = B0 +B1 EO + B2 INV + B3 EXP + B4 SER +u

4. Results and discussion :

4.1. Study of the stationarity of the variables

In order to carry out empirical modeling, it is necessary to ensure that all the variables are stationary before any econometric treatment.

The table below summarizes the results of the Augmented Dickey-Fuller (ADF) tests applied to all the variables in our model:

Table 1: Result of the stationarity test (ADF test)

UNIT ROOT TEST RESULTS TABLE (ADF)

Null Hypothesis: the variable has a unit root

At Level

		FDI	INV	EO	EXP	SER
With Constant	t-Statistic	-3.9558	-2.4043	-3.1046	-0.8896	1.2710
	Prob.	0.0069	-6.4996	0.0424	0.7700	0.9975
		***	0.0002	**	n0	n0
With Constant & Trend	t-Statistic	-3.5035	-2.2824	-3.6395	-4.6202	-4.3252
	Prob.	0.0649	0.4214	0.0518	0.0074	0.0141
		*	n0	*	***	n0
Without Constant & Trend	t-Statistic	0.0403	-0.6925	-0.0869	-1.0326	2.1318
	Prob.	0.6840	0.4047	0.6407	0.2612	0.9893
		n0	n0	n0	n0	n0

At First Difference

		d(FDI)	d(INV)	d(EO)	d(EXP)	d(SER)
With Constant	t-Statistic	-6.9918	-6.3840	-4.7202	-7.5490	-3.7737
	Prob.	0.0000	0.0000	0.0016	0.0000	0.0108
		***	***	***	***	**
With Constant & Trend	t-Statistic	-7.0805	-6.4996	-4.2679	-7.4986	-4.3875
	Prob.	0.0001	0.0008	0.0187	0.0000	0.0210
		***	***	**	***	**
Without Constant & Trend	t-Statistic	-7.2352	-6.4930	-4.8195	-7.6773	-3.2908
	Prob.	0.0000	0.0000	0.0001	0.0000	0.0023
		***	***	***	***	***

Notes:
a: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant
b: Lag Length based on SIC
c: Probability based on MacKinnon (1996) one-sided p-values.

Source: Results obtained from EVIEWS 12.0

According to the stationarity test carried out, we retain that all the variables of the model Foreign direct investments (FDI), Public investments (INV), Non-hydrocarbon exports (EXP), School enrollment rate (SER), economic openness (EO) are stationary variables at level.

4.2. Determining the optimal number of lags

To determine the optimal number of lags for an empirical model, the Akaike (AIC) and Schwarz (SC) information criteria must be used. Thus, the optimal lag is the one that minimizes the Akaike and Schwarz information criteria.

Table 2: Determination of the optimal number of delays

Endogenous variables: FDI INV EO EXP SER
Exogenous variables: C
Date: 01/01/23   Time: 14:14
Sample: 2000 2022
Included observations: 20

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-532.7867	NA	1.56e+17	53.77867	54.02760	53.82726
1	-493.5768	54.89380*	4.15e+16*	52.35768*	53.85128*	52.64925*
2	-472.3412	19.11209	1.09e+17	52.73412	55.47238	53.26865

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error

Source: Results obtained from the EVIEWS 12.0 software

Based on the criteria of Akaike and Schwarz which minimize the information criteria, we retain the VAR system of order 1 because the value 52.35 is qualified as the lowest.

4.3. ARCH and GARCH modeling

The ARCH and GARCH models represent a statistical methodology used in the analysis of time series.

In our study, the following table presents the results of the estimation of the (ARCH and GARCH) model with a lag, i.e. ARCH(1) and GARCH(1) :

Table 3: The modeling (ARCH and GARCH)

Dependent Variable: FDI
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Date: 01/01/23   Time: 14:33
Sample: 2000 2022
Included observations: 22
Convergence not achieved after 500 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
GARCH = C(6)*RESID(-1)^2 + (1 - C(6))*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
INV	3.253491	1.026812	31.68534	0.0000
EO	0.009392	0.003633	-2.585310	0.0097
EXPO	0.000544	0.003445	0.157795	0.8746
SER	0.004107	0.001251	3.282280	0.0010
C	8.614840	0.036025	239.1339	0.0000
Variance Equation				
RESID(-1)^2	0.993439	0.027619	35.96962	0.0000
GARCH(-1)	0.006561	0.027619	0.237555	0.8122
R-squared	0.877421	Mean dependent var		9.107902
Adjusted R-squared	0.848579	S.D. dependent var		0.237339
S.E. of regression	0.092356	Akaike info criterion		-2.581208
Sum squared resid	0.145002	Schwarz criterion		-2.283651
Log likelihood	34.39329	Hannan-Quinn criter.		-2.511112
Durbin-Watson stat	1.527379			

Source: Results obtained from EVIEWS 12.0 software

Based on the application of the modeling (ARCH and GARCH), we conclude that all coefficients in our econometric model are significant such that the probability of these coefficients is less than $\alpha = 0.05 = 5\%$.

4.4. Econometric relationship between the main determinants of foreign direct investment (foreign direct investment (FDI), the degree of economic openness, the schooling rate, public investment and non-hydrocarbon exports) in Algeria during the period 2000 – 2022

The main objective of our study is to identify the factors of attractiveness of foreign direct investments in Algeria during the period 2000 - 2022. To do this, we used the Granger causality test to determine the direction of the relationship between foreign direct investment (FDI) and the following variables: the degree of economic openness, the schooling

rate, public investment and non-hydrocarbon exports.

The following figure presents the results of the Granger causality test:

Table 4: Granger causality test

Pairwise Granger Causality Tests
Date: 01/01/23   Time: 14:03
Sample: 2000 2021
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
INV does not Granger Cause IDE	18	3.16504	0.0698
FDI does not Granger Cause INV		1.46331	0.2910
EO does not Granger Cause IDE	18	5.47776	0.0162
IDE does not Granger Cause EO		1.00542	0.4534
EXP does not Granger Cause FDI	18	3.30157	0.0631
FDI does not Granger Cause EXP		2.49769	0.1169
SER does not Granger Cause FDI	18	3.11054	0.0411
FDI does not Granger Cause SER		1.99013	0.1798

Source: Results obtained from EVIEWS 12.0 software

According to the table below, trade openness, domestic investment, exports and unemployment rate cause foreign direct investment (FDI), through the following indicators: Public investments (INV), Non-hydrocarbon exports (EXP), School enrollment rate (SER), economic openness (EO).

Thus, we notice the existence of a unidirectional causality of the degree of the economic opening, the domestic investments, the exports except hydrocarbons and the rate of schooling towards the foreign direct investments (FDI) what confirms the importance of these variables in the Algerian economy during the period 2000 - 2022.

4.5.   Interpretation of the results obtained

Empirical interpretation of the results

- The estimation of our ARCH and GARCH model shows that this equation is globally significant with (R^2= 0.87), i.e. 87% since it can

explain the variation of foreign direct investments (FDI). Thus, we can say that our model is globally significant,

- Schooling rate: the probability value of the schooling rate is less than 0.05. Thus, we can say that the variable of the Rate of schooling is a determining variable in the explanation of the foreign direct investments (FDI) in Algeria, and the latter is considered significant.
- Domestic investment: the probability value of domestic investment is less than 0.05. Thus, we can say that the variable of domestic investment is a determining variable in the explanation of foreign direct investment (FDI) in Algeria, and the latter is deemed significant.
- The economic openness: the probability value of the rate of economic openness is less than 0.05. So, we can say that the variable of economic openness rate is a determining variable in the explanation of foreign direct investments (FDI) in Algeria, and the latter is considered significant.

Economic interpretation of the results

According to the results obtained, we were able to observe a positive and significant influence of domestic investment on foreign direct investment (FDI) knowing that this variable is considered a very important and determining element of economic growth.

A 1% increase in domestic investment leads to an increase of 3.25 in foreign direct investment (FDI).

In addition, non-hydrocarbon exports have a positive influence on foreign direct investment (FDI).

A 1% increase in non-hydrocarbon exports leads to a 0.0005 increase in economic growth.

The school enrollment rate has a positive influence on foreign direct investment (FDI).

A 1% increase in the school enrollment rate leads to a 0.0004 increase in economic growth.

Thus, the degree of economic openness has a positive influence on foreign direct investment (FDI). A 1% increase in the degree of economic openness leads to a 0.009 increase in foreign direct investment.

5. Validation test of the empirical model (ARCH and GARCH)

After estimating a model (ARCH and GARCH), it is necessary to check whether the model adequately represents the dynamics of the modeled variables.

5.1. ARCH Heteroskedasticity Test

Table 5: Heteroskedasticity test of ARCH

Heteroskedasticity Test: ARCH

F-statistic	0.017471	Prob. F(1,19)	0.8962
Obs*R-squared	0.019293	Prob. Chi-Square(1)	0.8895

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Date: 01/01/23 Time: 14:34
Sample (adjusted): 2001 2021
Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.445966	0.580606	2.490444	0.0222
WGT_RESID^2(-1)	0.030279	0.229075	0.132180	0.8962

R-squared	0.000919	Mean dependent var	1.495842
Adjusted R-squared	-0.051665	S.D. dependent var	1.971857
S.E. of regression	2.022153	Akaike info criterion	4.336595
Sum squared resid	77.69293	Schwarz criterion	4.436073
Log likelihood	-43.53425	Hannan-Quinn criter.	4.358184
F-statistic	0.017471	Durbin-Watson stat	1.862695
Prob(F-statistic)	0.896232		

Source: Results obtained from EVIEWS 12.0 software

From the results obtained, we retain that the ARCH Heteroskedasticity test has a probability of 0.89, a statistical probability that is greater than 0.05=5%, which means that we accept the null hypothesis of ARCH Heteroskedasticity.

5.2. Correlogram test

Table 6 : The residuals test (Correlogram test)

Date: 01/01/23   Time: 14:35
Sample: 2000 2022
Included observations: 22

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	-0.154	-0.154	0.5930	0.441
		2	-0.013	-0.037	0.5973	0.742
		3	-0.092	-0.103	0.8349	0.841
		4	-0.191	-0.231	1.9096	0.752
		5	0.010	-0.076	1.9125	0.861
		6	-0.120	-0.177	2.3894	0.881
		7	0.003	-0.123	2.3896	0.935
		8	0.009	-0.105	2.3929	0.967
		9	-0.082	-0.197	2.6670	0.976
		10	-0.009	-0.202	2.6702	0.988
		11	0.146	0.007	3.6869	0.978
		12	0.095	0.026	4.1664	0.980

*Probabilities may not be valid for this equation specification.
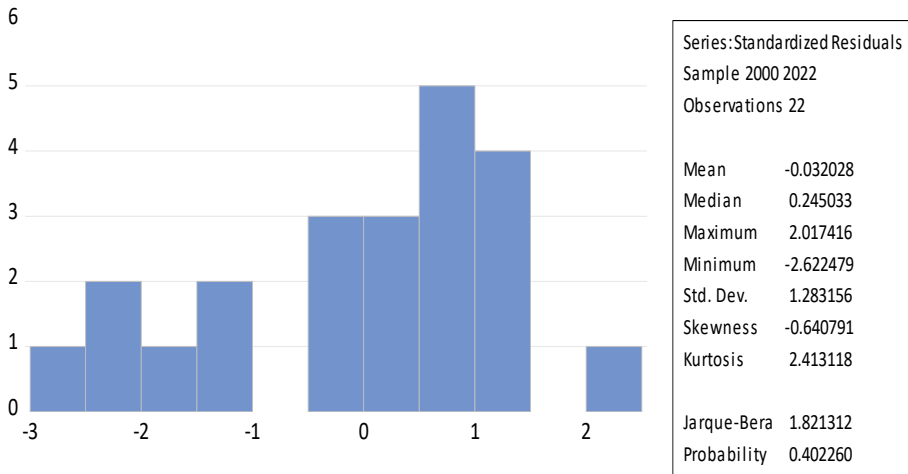
Source: Results obtained from EVIEWS 12.0 software

The correlogram test is considered as a test of the errors of one variable with respect to another.

From the results obtained, we can see that the correlations of the errors are globally within the bounds.

5.3. Normality test

Table 7 : Jarque-Bera normality test

Series: Standardized Residuals	
Sample 2000 2022	
Observations 22	
Mean	-0.032028
Median	0.245033
Maximum	2.017416
Minimum	-2.622479
Std. Dev.	1.283156
Skewness	-0.640791
Kurtosis	2.413118
Jarque-Bera	1.821312
Probability	0.402260

Source: Results obtained from the EVIEWS 12.0 software

In our model, the probability of the Jarque-Bera test is 0.4022 a value

greater than 0.05=5%, which means that we accept the null hypothesis of normality of the error terms or residual.

6. Discussion of results :

The analysis of our study has allowed us to study the main determinants of foreign direct investment in Algeria during the period 2000 - 2022. These results show that the following variables: the degree of economic openness, the rate of schooling, public investment and non-hydrocarbon exports have a significant positive impact on the flow of foreign direct investment in Algeria. Therefore, our contribution is summarized in the following points:

- The estimation of our ARCH and GARCH model shows that this equation is globally significant with (R^2= 0.87), i.e. 87% since it can explain the variation of foreign direct investments (FDI). Thus, we can say that our model is globally significant,
- The existence of a unidirectional causality of the degree of economic openings, the domestic investments, the exports except hydrocarbons and the rate of schooling towards the foreign direct investments (FDI) what confirms the importance of these variables in the Algerian economy during the period 2000 - 2022.

Thus, the foreign direct investment is recognized as a key element to stimulate the Algerian economy, and as an essential factor of economic growth and development, likely to play a major role in helping the transformation of planned economies into market economies. Therefore, FDI constitutes a source of financing and technical and management know-how.

7. Conclusion:

In the recent decade, the Algerian economy is facing a challenge to boost the degree of economic diversification in order to rely on more sources of income, one of the efforts is to attract foreign investors in order to bring competitive, experience and create an added value in global market.

Similar to other countries depending on one external source of financing budget deficit, economists and policy makers started to design

strategies and plan for actions to increase the rate of foreign direct investment, as it is a decisive accelerator for economic development and growth.

Regardless the anterior empirical studies, they suggest that foreign direct investment had positive effects of macroeconomic variables, and there is a causal linkage relationship in a manner that the selected parameters in the study help the Algerian economy to attract foreign investors. For that in this paper we aim to to determine the different factors of attractiveness of foreign direct investments (FDI) in Algeria during the period 2000 - 2022 and to test if there is a causal relationship between FDI, degree of economic openness, the rate of schooling, public investment and export.

We utilized several econometric methods to test if there is a causal relationship between FDI, degree of economic openness, the rate of schooling, public investment and export.

Our empirical results, show that the following variables: the degree of economic openness, the rate of schooling, public investment and non-hydrocarbon exports have a significant positive impact on the flow of foreign direct investment.

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