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The Impact of Monetary Policy on Foreign Direct Investment Inflows in Algeria (1990-2019): An Empirical Study

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Abstract:
The present study aims to highlight the impact of monetary policy, represented by the money supply and the discount rate, on foreign direct investment inflows in Algeria. The study relies on annual data covering the period from 1990 to 2019 and employing the Vector Auto Regressive (VAR) methodology, along with Granger causality tests. The findings reveal the lack of a long-term equilibrium connection between monetary policy instruments and the inflow of foreign direct investment in Algeria. Furthermore, by utilizing response analysis functions, the study demonstrates that a structural shock in the discount rate variable exerts a negative influence on foreign direct investment both in the short and long run. On the other hand, a shock in the money supply variable showcases a positive impact on short-term foreign direct investment flows, which transforms into a negative effect in the medium and long terms. Notably, the results emphasized the substantial contribution of the discount rate in elucidating the fluctuations in foreign direct investment in Algeria throughout the study period.
Key words: Money Supply; Discount Rate; Foreign Direct Investment; VAR Model.
Jel Classification Codes: E52, F21, C25.

1. Introduction

Foreign direct investment (FDI) holds significant importance in the economies of most countries due to its prominent role in financing the

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economy, particularly in achieving overall economic development. As a result, many countries have sought to create a conducive environment to attract such investments by implementing various economic policies. One of the notable policies in this regard is monetary policy, which stands as a pivotal economic tool impacting the attraction of foreign investment through the coordination of its diverse instruments.

On the footsteps of many developing nations, Algeria endeavours to attract a substantial amount of foreign direct investments to enhance its economy and achieve genuine economic development. This is being pursued by providing a fertile ground for foreign direct investment through a range of economic policies, with monetary policy being a key driver. This involves leveraging various tools, including controlling the money supply and adjusting the discount rate, to encourage foreign investors.

1.1. Study Problem:

In light of the above, the significance of monetary policy in influencing foreign direct investment inflows in Algeria becomes evident. Thus, the present study aims to address the following main question: To what extent does monetary policy impact foreign direct investment inflows in Algeria?

1.2. Study Hypotheses

The study is based on two fundamental hypotheses:

-There is a complementary relationship between monetary policy instruments and foreign direct investment inflows in Algeria.

-Monetary policy instruments play a significant role in influencing foreign direct investment inflows in Algeria during the study period.

1.3. Study Objectives

This study aims to understand the evolution of foreign direct investment inflows to Algeria during the period 1990-2019. It sheds light on the nature of the relationship between monetary policy and foreign direct investment inflows in Algeria by endeavouring to construct a standard model that represents this relationship.

1.4. Study Approach

In our study, we adopted a descriptive-analytical approach to present the reality of the study variables' developments. Additionally, we utilized a quantitative statistical approach through econometric methods and tools to examine the impact between the independent variables represented by the money supply and discount rate and the dependent variable representing foreign direct investment inflows in Algeria.

1.5. Methodology

To examine the impact of money supply on foreign direct investment inflows, this study is divided into two main axes:

-The First Axis: Analysis of the Evolution of Study Variables in Algeria during the Period 1990-2019.

-The Second Axis: Empirical Study.

2. Previous Studies

There is a number of previous studies that have addressed the impact of monetary policy on foreign direct investment inflows. It can be noted that the results obtained from these studies have been diverse, because of the complex measurement methods. This section provides an overview of these studies along with their key findings:

- Allawi and Bourouacha (2015) examined the impact of monetary and fiscal policy on foreign direct investment inflows in Algeria during the period 1990-2012. This study relied on annual data for variables such as the discount rate, exchange rate, money supply, public expenditure, and foreign direct investment. The study employed the Vector Autoregression (VAR) method. It identified a causal relationship that shifts from public spending, money supply, and the discount rate towards foreign direct investment. Moreover, it revealed a positive and statistically significant impact of both monetary and fiscal policies on foreign direct investment in Algeria (Allawi, 2015, pp. 31-51).
- Kaddouri and Saket (2018) addressed the impact of monetary and fiscal policy on foreign direct investment in Algeria during the period 1990-2016. This study utilized annual data for variables such as government expenditure, ordinary tax revenue, discount rate, exchange rate, money supply, and foreign direct investment. The Autoregressive Distributed Lag (ARDL) approach for co-integration analysis was employed. The study concluded that government expenditure and money supply contribute to an increase in foreign direct investment inflows, while the exchange rate has a limited and minor effect. On the other hand, ordinary tax revenue and the discount rate exhibit a negative impact on foreign direct investment inflows in Algeria (Kaddouri and Saket, 2018, pp. 222-241).
- Ateyah, Al-Fawwaz, and George N. (2015) examined the impact of fiscal and quantitative monetary policies on local and foreign direct investment in Jordan during the period 2000-2011. Two models were employed in this

study. The first model assessed the effect of fiscal and quantitative monetary policies on local investment. The study found a non-significant negative relationship between the discount rate and local investment. However, a significant positive relationship was observed between mandatory cash reserves and local investment. The study also revealed a negative relationship between taxes and local investment, and a positive relationship between government capital expenditure and local investment. This suggests that fiscal policy effectiveness outweighs the impact of monetary policy on local investment. The second sample illustrated the impact of fiscal and quantitative monetary policies on foreign direct investment. The results showed a significant negative relationship between the discount rate and foreign direct investment. However, it revealed a significant positive relationship between taxes and the value of foreign direct investment in Jordan. The reason for this is that the Jordanian government offers tax exemptions to encourage foreign direct investment (Ateyah, 2015, pp. 1-10).

These previous studies were reviewed in order to gain an understanding of the research problem and to be in line with the latest developments in the field. This was carried out to present the key findings of each study in relation to the variables of this study, and to provide an overview of the topic. Most of these studies utilized quantitative measurements to examine the impact of fiscal and monetary policies on foreign direct investment. However, the sole impact of monetary policy was neglected in the model. This is essential to conducting this study, which aligns with previous studies in shaping the study model. Nevertheless, this study is different in terms of its objectives, the adopted standard model, and its modern and relatively extended period of analysis – spanning approximately 30 years.

3. First Axis: Analysis of the Evolution of Study Variables in Algeria during the Period 1990-2019.

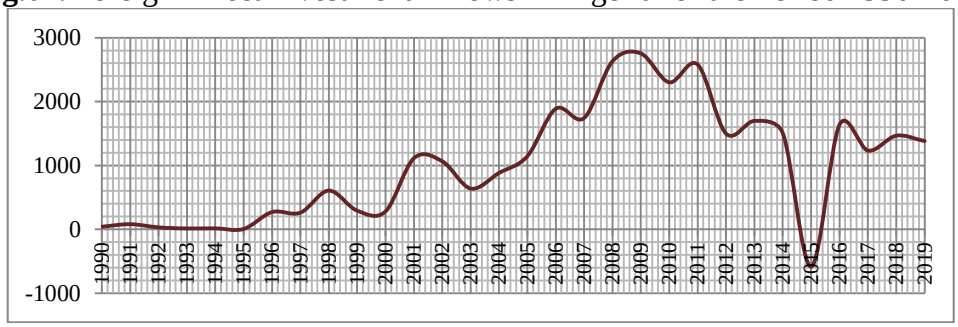
Algeria has made significant developments in improving the investment climate through a series of economic reforms, particularly in relation to monetary policy, aimed at attracting foreign capital (Taaba, 2019, p. 146). This axis delve into the developments of both foreign direct investment inflows and monetary policy tools in Algeria from 1990 to 2019.

3.1. Analysis of the Evolution of Foreign Direct Investment Inflows in Algeria:

Foreign direct investment (FDI) is defined as the engagement of a foreign party in investing in the assets of other countries, where the investor

plays an active role in managing these assets, such as establishing new companies or merging with domestic companies. This also encompasses privatization activities, where foreigners buy companies or portions thereof within host countries. The FDI inflows into Algeria have witnessed various developments, as presented in the following figure, during the period 1990-2019:

Fig.01. Foreign Direct Investment Inflows in Algeria for the Period 1990-2019



Source: Prepared by researchers using data from EXCEL software outputs.

Considering the above figure, it becomes evident that foreign direct investment (FDI) inflows in Algeria have undergone several stages. In the first years of the study, there was almost complete absence, recording $40 million in 1990, which further declined to $5 million in 1995. This was due to the complex situation Algeria faced during this period, stemming from deteriorating security, political and economic instability, high levels of risk, in addition to external debt crisis and the resulting economic challenges (Hussein, 2009, p. 59).

Starting from 1996, FDI inflows began to show significant improvement, ranging from $270 million in 1996 to $280 million in 2000, with a majority of these investments directed towards the energy sector. It is noteworthy that during this period, Algeria lagged behind most neighbouring countries in terms of incoming investments. The trend of increasing foreign investment into Algeria continued, with values fluctuating between $1.113 billion in 2001 and $2.58 billion in 2011. This resurgence can be attributed to the economic reforms undertaken by the Algerian government and substantial incentives provided to foreign investors. Furthermore, the improvement in security and economic conditions also played a role in this positive trend.

Starting from the year 2012 until 2015, foreign direct investment (FDI) inflows experienced continuous fluctuations between growth and decline. The worst performance for these inflows was recorded in 2015 with a negative value of $584.52 million. This decrease was a result of the global decline in investment flows, coupled with the implementation of the 51/49 rule which limited the contribution of foreign partners and mandated them to seek local partners for projects.

Beginning in 2016, foreign investments showed some improvement, ranging from $1.636 billion in 2016 to $1.381 billion in 2019. This improvement can be attributed to the investment policies in place and the recent recovery observed in the oil sector, as well as the security conditions affecting many Arab countries.

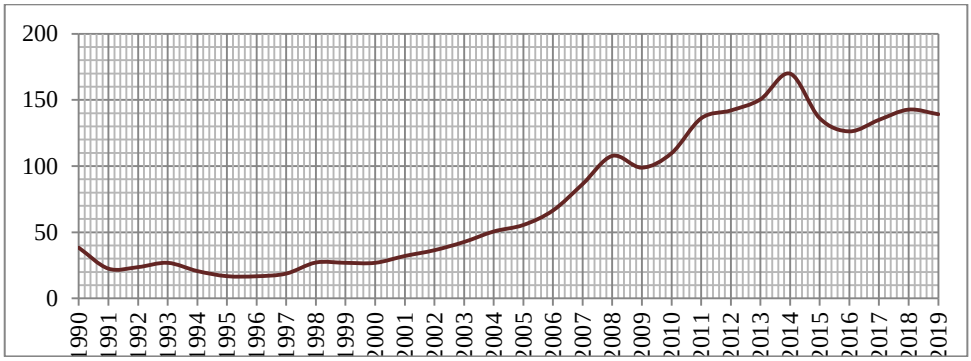
3.2. Analysis of the Evolution of Monetary Policy Tools in Algeria

Monetary policy is defined as the set of rules, methods, and measures undertaken by the monetary authority with the aim of influencing the money supply in harmony with economic activity to achieve desired objectives over a specific period (al-Hamid, 2003, p. 90). This is accomplished through a range of tools, among the most significant of which are the money supply and the discount rate. This section delves into the analysis of the evolution of these tools.

3.2.1. Analysis of the Evolution of Money Supply in Algeria

Monetary policy in Algeria has been characterized by its connection to economic conditions, global circumstances, and their direct impact on the money supply in the country, particularly following the issuance of the Banking and Credit Law 10/90 (Sari, 2014, p. 24). The study relies on the monetary aggregate M2 to represent the money supply, which includes currency notes and coins as well as deposits and quasi-money. The following figure illustrates the evolution of the money supply in Algeria during the period 1990-2019

Fig.02. Evolution of the Money Supply in Algeria for the Period 1990-2019



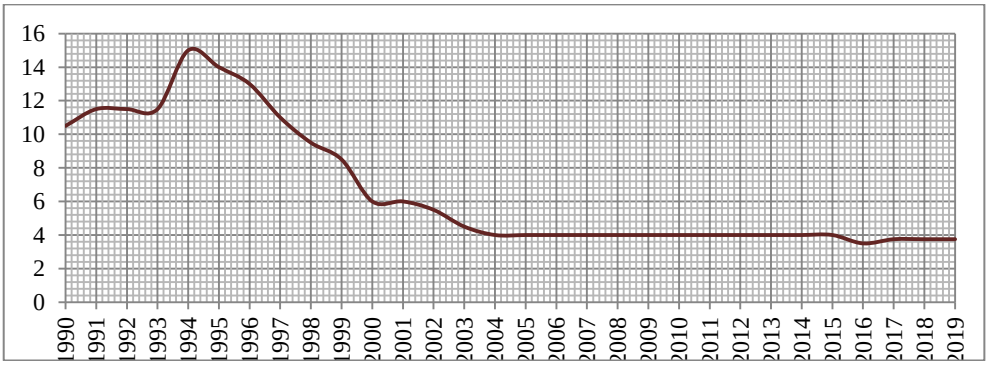
Source: Prepared by researchers based on outputs from EXCEL software.

By examining the above figure, it becomes evident that the money supply in Algeria has undergone several developments during the study period. From 1990 to 2000, there was slow growth ranging between $22.48 million in 1991 and $26.87 million in 2000. This was a result of the strict policy implemented by the Algerian government to restore monetary stability. Starting from 2001 to 2014, the money supply experienced rapid and notable growth, reaching $36.41 million in 2002 and increasing to $169.58 million in 2014. This increase can be attributed to the overall economic indicators improving in Algeria due to the rise in global oil prices. However, during the period from 2015 to 2019, the money supply witnessed fluctuating growth due to the decline in global oil prices, which constitute the primary source of Algerian exports.

3.2.2. Analysis of the Evolution of the Discount Rate in Algeria

The discount rate is defined as the interest rate that the central bank charges for discounting commercial papers presented by commercial banks for discounting, and for borrowing from it as it is considered the sole source of borrowing (Hassani, 2019, p. 741). The discount rate in Algeria has witnessed several developments during the period 1990-2019. The following figure illustrates these developments.

Fig.03. Evolution of the Discount Rate in Algeria for the Period 1990-2019



Source: Prepared by the researchers using Excel software outputs.

By examining the above figure, it becomes apparent that the discount rate in Algeria during the period 1990-2019 underwent three stages:

a. First Stage: 1990-1994: This stage was characterized by a noticeable increase in the discount rates in Algeria. In 1990, the rate was at 10.5%, rising to 15% in 1994, marking the highest rate applied in Algeria. This increase can be attributed to the contractionary policy adopted by the Bank of Algeria during this period to curb high inflation.
b. Second Stage: 1995-2003: This stage was marked by continuous reductions in the discount rate by the Algerian monetary authorities. The rate dropped from 14% in 1995 to around 4.5% in 2003. The reason for these reductions was the Algerian monetary authorities' attempt to combat inflation through stabilization and structural adjustment programs in collaboration with the International Monetary Fund.
c. Third Stage: 2004-2019: This stage witnessed stability in the discount rates in Algeria, with the rate being 4% in 2004 and remaining at 3.75% from 2016 to 2019. This stability can be attributed to the Algerian monetary authorities' efforts to stimulate the national economy by implementing expansionary policies aimed at addressing periods of recession experienced by the economy.

4. Second Axis: Empirical Study

In order to study the impact of monetary policy on foreign direct investment (FDI) inflows in Algeria during the period 1990-2019, annual data obtained from the World Bank and the Bank of Algeria are utilized. The study considered the money supply aggregate M2 and the discount rate (RR) as independent variables, while foreign direct investment (FDI) inflows was the dependent variable. We employed the Vector Autoregressive (VAR) methodology, which is considered a modern

standard model for studying relationships between variables. This methodology was proposed by Sims in 1980 (Sims, 1980, pp. 1-48), who believed that the traditional approach to constructing econometric models heavily relies on interpretive perspectives, often involving untested assumptions.

Sims introduced a system of equations in which each dependent variable in the system is a linear function of its past values and the past values of other internal variables. Our approach begins by examining the stability of the study variables. Subsequently, the study applies the VAR methodology and analyses the obtained results.

4.1. Stationarity Analysis of Study Variables

Before estimating the Vector Autoregressive (VAR) model, it is essential to ensure the stationarity of the time series included in the study model. This is done to avoid the issue of Spurious Regressions, which refers to regressions that show good results in terms of t-tests and F-tests and have high R-squared values, but lack meaningful economic interpretation. In other words, using Ordinary Least Squares (OLS) regression may provide misleading results if the underlying time series are not stable.

The study emloys the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests for unit roots. The results of these two tests are presented in Appendix 01. The results of both tests indicate a match, revealing that the variables: Money Supply (M2), Discount Rate (RR), and Foreign Direct Investment (FDI) are not stationary at levels, as the associated p-values for both tests are greater than 0.05.

Upon conducting first-order differences, it becomes evident that the study variables are stationary in first differences, meaning they are integrated of order one, denoted as I(1). This implies that there may exist a long-term equilibrium relationship between Foreign Direct Investment and Monetary Policy variables.

4.1.1. Co-integration Test for Model Variables

After confirming that the model variables are integrated of order one, indicating the potential presence of a long-term co-integration relationship among these variables, the next step is to assess the possibility of a co-integration relationship among them. If such a co-integration relationship exists, the long-term model should be estimated and corrected using the Error Correction Model (ECM) methodology. In this stage, co-integration

tests are perform based on the methodologies of Johansen and Pesaran et al., as follows:

4.2.1. Johansen Co-integration Test: To conduct the co-integration test using the Johansen methodology, the following steps are followed:

4.2.1.1. Optimal Lag Selection (VAR(P)): Prior to performing the Johansen co-integration test, it is necessary to determine the optimal lag order (P) for the VAR model. This is achieved by applying various criteria for model differentiation. The results of this lag selection are outlined in Appendix 02, where it becomes evident that all differentiation criteria point towards an optimal lag order of one year, i.e., (P=1).

4.2.1.2. Johansen Co-integration Test: The Johansen test, proposed in 1991 (Johansen, 1991, pp. 1551-1580), is considered one of the most suitable modern tests for co-integration, especially for small sample sizes and when multiple variables are involved. It is employed when more than two variables are present. The test relies on assessing the imposed restrictions of co-integration on the unrestricted model.

Based on the Johansen methodology, two tests are utilized: the Trace Test and the Maximum Eigen value Test. The null hypothesis can be accepted because the statistics for both the Trace Test and the Maximum Eigen value Test are lower than the critical values at a 5% significance level. This leads to the conclusion that there is no long-term equilibrium relationship between Money Supply, Discount Rate, and Foreign Direct Investment in Algeria during the study period.

4.2.2. Bounds Testing for Co-integration Method: To conduct the co-integration test using the Bounds Testing approach, these steps are followed:

4.2.2.1. Determining the Optimal Lag Length for the Unrestricted Error Correction Model (UECM): In order to identify the optimal lag lengths for the variables in the ARDL(p,q1,q2) model, the Akaike criteria are utilized for model selection and rely on Eviews10 software. The results of this test are illustrated in Appendix 05, where it can be observed that the optimal lag lengths that correspond to the ARDL(p,q1,q2) model are ARDL(1,3,0).

4.2.2.2. Bounds Test Results: After determining the optimal lag lengths for the variables in the model, the Bounds Test is then conducted, a method developed by Pesaran et al. in 2001. It is considered one of the best tests for detecting the presence of long-run co-integration among independent variables directed towards the dependent variable. This test relies on the

Fisher statistic, and its null hypothesis assumes the absence of a long-run equilibrium relationship between the variables.

The Bounds Test involves comparing the calculated Fisher statistics with critical values derived by Pesaran. If the calculated statistic is greater than the upper critical value, the null hypothesis of the test is rejected. However, if the calculated statistics are smaller than the lower critical value, the null hypothesis is accepted. When the calculated Fisher statistics fall between the lower and upper critical values, it signifies an inconclusive outcome.

The results of this test are presented in Table 01, where the findings indicate that the calculated Fisher statistic (F=2.51) is lower than the lower critical value. Therefore, the null hypothesis is accepted, which suggests the absence of a long-term equilibrium relationship between Foreign Direct Investment and both Money Supply and Discount Rate. These results support the outcomes obtained from the Johansen test, implying that the model should be estimated using the VAR methodology.

Table 01. Results of the Bounds Test for Cointegration

F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	2.519399	10%	2.63	3.35
k	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5

Source: Prepared by researchers based on the outputs of Eviews 10 software**.**

4.3. Estimation of the Dynamic Equation for the Short-Term VAR(1) Model

After ensuring the stationary nature of the time series and the absence of a long-term equilibrium relationship between the study variables, the dynamic equation for the short-term model is then estimated. The following table illustrates the estimation results.

Table 02. Results of VAR(1) Model Estimation

Vector Autoregressive Estimates **Sample (adjusted): 1991 2019** **Standard errors in ( ) & t-statistics in [ ]**			
	FDI	M2	RR
FDI(-1)	0.435875	0.006125	-1.81E-05
	(0.17726)	(0.00311)	(0.00031)
	[2.45899]	[1.96821]	[-0.05806]

M2(-1)	-3.324014	0.859051	0.004164
	(3.34909)	(0.05880)	(0.00587)
	[-0.99251]	[14.6095]	[0.70883]
RR(-1)	-129.1373	-1.240131	0.995089
	(50.4068)	(0.88500)	(0.08842)
	[-2.56190]	[-1.40127]	[11.2543]
C	2058.598	12.33631	-0.470809
	(645.712)	(11.3369)	(1.13264)
	[3.18811]	[1.08815]	[-0.41567]
R-squared	0.603817	0.964264	0.929292
Adj. R-squared	0.556275	0.959976	0.920807
Sum sq. resids	8987300.	2770.393	27.65279
S.E. equation	599.5765	10.52690	1.051718
F-statistic	12.70072	224.8573	109.5215
Log likelihood	-224.4876	-107.2612	-40.45946
Akaike AIC	15.75777	7.673188	3.066170
Schwarz SC	15.94636	7.861780	3.254762
Mean dependent	1633.783	75.53926	6.560345
S.D. dependent	900.0937	52.61843	3.737273

Source: Prepared by researchers based on the outputs of Eviews 10 software.

Through Table 02, the equation for Foreign Direct Investment can be expressed in terms of Money Supply and Discount Rate as follows:

$$FDI_t = 2058.59 + 0.43FDI_{t-1} - 3.32M2_{t-1} - 129.13RR_{t-1}$$

R^2=0.60 Adj. R^2=0.55 F-statistic=12.70

Through the equation of Foreign Direct Investment in the short term, the following results can be observed:

- There is a significant positive relationship at a 5% significance level between Foreign Direct Investment and its lagged value by one year. An increase in the lagged value of Foreign Direct Investment for a given year is expected to lead to a continuation of the increase in the following year.
- There is a non-significant inverse relationship between Money Supply and Foreign Direct Investment. In other words, Foreign Direct Investment is not influenced by short-term changes in Money Supply.
- There is a significant negative relationship at a 5% significance level between the Discount Rate and Foreign Direct Investment in the short term. A 1% increase in the Discount Rate leads to a decrease in Foreign Direct Investment in Algeria by $129 million.
- The Fisher statistic value (F = 12.70) has a p-value (Prob = 0.0000) which is less than 0.05. This indicates the rejection of the null hypothesis

and acceptance of the alternative hypothesis, suggesting that the overall model is statistically significant. The explanatory power of the model reaches 60%, indicating that the explanatory variables included in the model are able to explain 60% of the variation in Foreign Direct Investment in Algeria. This 60% explanatory ratio is considered substantial for analysis and study purposes.

4.4. Diagnostic Tests of the Model

After estimating the VAR(1) model, it is subjected to a set of statistical tests in this stage to determine its adequacy and ability to represent the studied model variables. These tests include the following:

4.4.1. Autocorrelation Test of Model Residuals

To verify the absence of autocorrelation among the residuals of the estimated VAR(1) model, the Lagrange Multiplier (LM) test with a lag of h=10 is employed. The null hypothesis for this test posits that there is no autocorrelation among the model residuals. The results are illustrated in Table 03, as follows:

Table 03. LM Test Results

VAR Residual Serial Correlation LM Tests **Date: 05/11/22 Time: 14:30** **Sample: 1990 2019**						
Null hypothesis: No serial correlation at lag h						
Lag	**LRE* stat**	**df**	**Prob.**	**Rao F-stat**	**df**	**Prob.**
1	7.642681	9	0.5705	0.853177	(9, 48.8)	0.5721
2	11.80256	9	0.2247	1.372673	(9, 48.8)	0.2264
3	3.719196	9	0.9289	0.399637	(9, 48.8)	0.9292
4	5.059534	9	0.8291	0.550766	(9, 48.8)	0.8299
5	4.825200	9	0.8493	0.524064	(9, 48.8)	0.8500
6	23.47700	9	0.0052	3.071838	(9, 48.8)	0.0054
7	12.51260	9	0.1859	1.465545	(9, 48.8)	0.1875
8	6.058848	9	0.7340	0.665989	(9, 48.8)	0.7351
9	10.86886	9	0.2848	1.252449	(9, 48.8)	0.2866
10	5.109143	9	0.8247	0.556434	(9, 48.8)	0.8255

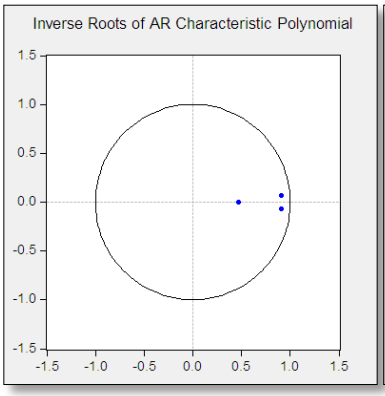
Source: Prepared by researchers based on the outputs of Eviews 10 software.

Based on the results from the above table, it is evident that there is an absence of autocorrelation among the estimated model residuals. This implies the acceptance of the null hypothesis at a significance level of 5%, as the associated p-value for the LM statistics are greater than 0.05.

4.4.2. Stability Analysis of the Model:

The instability of the model would render the results obtained from its use invalid, such as impulse response functions and variance decomposition functions. Therefore, it is necessary to ensure that the estimated model satisfies the stability condition. The results of this test are illustrated in Figure 04 as follows:

Fig.04. Results of the Stability Test for VAR(1) Model



Roots of Characteristic Polynomial
Endogenous variables: FDI M2 RR
Exogenous variables: C
Lag specification: 1 1
Date: 03/18/21 Time: 14:41

Root	Modulus
0.911841 - 0.065586i	0.914196
0.911841 + 0.065586i	0.914196
0.466334	0.466334

No root lies outside the unit circle.
VAR satisfies the stability condition.

Source: Prepared by researchers based on the outputs of Eviews 10 software.

By observing the above figure, it becomes evident that all the eigen values of the estimated model's coefficient matrix are less than 1, meaning they lie within the unit circle. This indicates that the model is stable. Based on this observation, it can be concluded that the model is free from typical issues, indicating the robustness of the estimated model. Therefore, its formulation is accurate.

4.5. Granger Causality Test

Variance analysis tests and impulse response functions are conducted using the Cholesky decomposition method, which assumes a specific order for the variables. In this method, each variable is influenced simultaneously by the preceding variables in the order, but not by the subsequent ones. Therefore, the results of variance analysis and impulse response functions are sensitive to the order of variables.

The Granger causality test is employed to determine the direction of relationships between variables, and accordingly, the variables are arranged. The results of this test are presented in Table 04, as follows:

Table 04. Granger Causality Test Results

Pairwise Granger Causality Tests **Sample: 1990 2019** **Lags: 1**			
Null Hypothesis:	Obs	F-Statistic	Prob
M2 does not Granger Cause FDI	29	0.19876	0.6594

FDI does not Granger Cause M2		8.29366	0.0079
RR does not Granger Cause FDI	29	5.82290	0.0232
FDI does not Granger Cause RR		0.00902	0.9251
RR does not Granger Cause M2	29	6.02482	0.0211
M2 does not Granger Cause RR		0.52816	0.4739

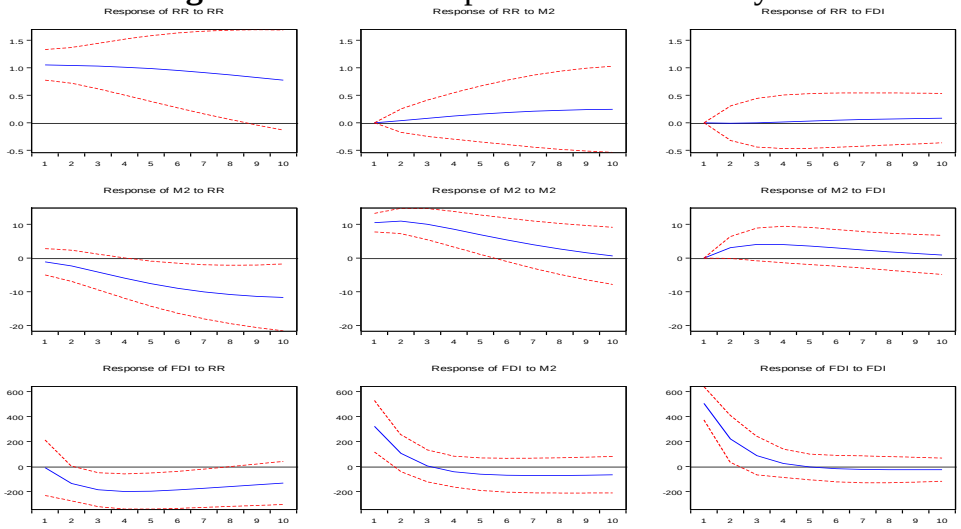
Source: Prepared by researchers based on the outputs of Eviews 10 software.

The presence of causality between variables is accepted if the corresponding probability value (Prob) is less than 0.05. Thus, a causal relationship from the Foreign Direct Investment variable towards the Money Supply variable is observed, as well as a causal relationship from the Discount Rate variable towards Foreign Direct Investment. Additionally, a causal relationship is detected from the Discount Rate variable towards the Money Supply variable, while these relationships are absent in the reverse directions. This implies that the Discount Rate significantly contributes to improving the predictive ability of Foreign Direct Investment in Algeria at a confidence level of 95%.

4.6. Response Function Analysis

The purpose of response function analysis is to examine the behaviour of the internal variables within the model in response to various shocks that the model may encounter. A shock is applied to the Money Supply and Discount Rate variables in the initial period and track their impact on Foreign Direct Investment inflows in Algeria over a period of 10 years. The results of this test are illustrated in Figure 05, as follows:

Fig.05. Results of Response Function Analysis



Source: Prepared by researchers based on the outputs of Eviews 10 software.

The above results reveal the following observations:

- A structural shock of one standard deviation in the money supply variable induces a diminishing positive impact on Foreign Direct Investment (FDI) in Algeria over the first three years. FDI responds immediately with an increase of $322.06 million, gradually decreasing to $4.70 million by the end of the third period. Subsequently, this effect turns negative starting from the fourth period and persists throughout the ten-year response period. This suggests a positive short-term relationship between the money supply and FDI, transitioning to a negative relationship in the medium and long terms. These results can be interpreted by the unstable growth of the money supply in Algeria due to fluctuating government policies and global oil price volatility, significantly affecting FDI inflows.
- A structural shock of one standard deviation in the discount rate variable leads to a diminishing negative impact on FDI in Algeria over a ten-year response period. FDI responds immediately with a decrease of $10.26 million, further declining to -$132.39 million by the end of the tenth period. This implies an inverse relationship between the discount rate and FDI in the short, medium, and long terms. This aligns with economic theory, as reducing discount rates is considered a crucial factor for supporting and encouraging investment.

4.7. Variance Decomposition Analysis

Variance decomposition analysis aims to determine the proportion of forecast error variance for the studied variable attributed to unforeseen shocks for each variable within the model during the forecast period. It quantifies the contribution of random shocks to the model's variables in explaining future conditional fluctuations of a specific variable. In this study, the relationship between both the money supply and the discount rate variables with Foreign Direct Investment (FDI) in Algeria is investigated. The results of this test are presented in Table 05 as follows:

Table 05. Variance Decomposition Analysis Results

Variance Decomposition of RR:				
Period	**S.E.**	**RR**	**M2**	**FDI**
1	1.051718	100.0000	0.000000	0.000000
4	2.073004	99.45607	0.536741	0.007185
5	2.300605	99.06687	0.909016	0.024112
6	2.497131	98.61082	1.335011	0.054173
7	2.667742	98.11433	1.790291	0.095375

10	3.055693	96.57634	3.166120	0.257543
Variance Decomposition of M2:				
Period	**S.E.**	**RR**	**M2**	**FDI**
1	10.52690	1.139790	98.86021	0.000000
4	22.45120	11.78513	79.94789	8.266980
5	24.95078	18.84105	72.43249	8.726457
6	27.21727	26.69627	64.76332	8.540406
7	29.37539	34.59670	57.40270	8.000592
10	35.52467	54.00032	40.05187	5.947812
Variance Decomposition of FDI:				
Period	**S.E.**	**RR**	**M2**	**FDI**
1	599.5765	0.029304	28.85429	71.11641
4	722.9738	17.91789	22.31604	59.76606
5	752.2197	23.48478	21.30261	55.21262
6	778.8182	27.74673	20.69530	51.55797
7	801.9249	30.93859	20.34508	48.71633
10	851.1118	36.41857	20.05438	43.52705

Source: Prepared by researchers based on the outputs of Eviews 10 software.

From the variance analysis results, it is evident that shocks in foreign direct investment inflows are attributed to the variable itself by 71.11% in the first year, decreasing to 55.44% in the fifth year and further reducing to 43.52% in the tenth year. Amidst this decline, a significant contribution of money supply to explaining fluctuations in foreign direct investment is observed in the first year at 28.85%, gradually decreasing to 20.05% in the tenth year. In contrast, the contribution of the discount rate in explaining fluctuations in foreign direct investment increases. It is almost negligible in the initial period, but it rises to 27.76% in the fifth year and further to 36.41% in the tenth year. This signifies the substantial role of the discount rate in explaining fluctuations in foreign direct investment in Algeria in the medium and long terms. These findings support the results obtained in the causality tests.

5. Conclusion

Foreign direct investment (FDI) is considered one of the key drivers of economic development and a form of capital inflow. Therefore, Algeria has sought to create an investment-friendly climate to attract foreign capital by implementing a series of economic reforms, including reforms in monetary policy. This study aimed to shed light on the impact of monetary policy on foreign direct investment inflows in Algeria, using a standard model that incorporates variables such as money supply, discount rate, and incoming

foreign direct investment flows during the period 1990-2019. Based on the findings, several conclusions have been reached, leading to the formulation of a set of recommendations.

5.1. Hypothesis Testing

• Regarding the first hypothesis, which suggests the existence of a co-integration relationship between monetary policy tools and foreign direct investment (FDI) inflows in Algeria, the study found that this hypothesis is not valid. Johansen's and Pesaran and Shain's tests for co-integration indicated the absence of a Co-integration relationship between monetary policy tools and FDI inflows in Algeria.

• As for the second hypothesis, which emphasizes the significant role of monetary policy tools in influencing FDI inflows in Algeria during the study period, the study confirmed the validity of this hypothesis. Response functions indicate either an inverse or causative relationship between the discount rate and the money supply on one hand, and FDI inflows on the other hand. Additionally, these tools contribute to explaining the future conditional fluctuations in FDI inflows in Algeria. There are also causal relationships between these tools and FDI inflows

5.2. Results

- Monetary policy plays a significant role in influencing foreign direct investment flows in Algeria.
- Unit root tests indicate that both money supply, discount rate, and foreign direct investment in Algeria are integrated of order one.
- Joint co-integration tests by Johansen and Pesaran et al. reveal that there is no long-term equilibrium relationship between the monetary policy variables included in the model and foreign direct investment flows in Algeria during the study period.
- Impulse response analysis shows an inverse relationship between the discount rate and foreign direct investment flows in both the short and long term. Conversely, there is a positive relationship between money supply and short-term foreign direct investment flows, which turns into an inverse relationship in the medium and long term.
- Variance decomposition indicates that the discount rate significantly contributes to explaining the future conditional volatility of foreign direct investment flows in Algeria in the medium and long term, unlike money supply, which has a substantial contribution in the short term only.
- Causality tests demonstrate a causal relationship from the discount rate to both money supply and foreign direct investment flows in Algeria, as

well as a causal relationship from foreign direct investment to money supply. Additionally, there is an absence of causality in the opposite direction, reinforcing the findings obtained from the variance decomposition analysis.

5.3. Recommendations

- It is essential to activate laws that grant expanded authority to institutions related to investment in Algeria. Additionally, providing necessary guarantees to foreign investors to encourage them to increase their investment volume is crucial.
- Efforts should be directed towards implementing more effective monetary policies aimed at targeting inflation and maintaining monetary stability. This approach aims to promote foreign investment in Algeria.
- Attempts should be made to eliminate administrative and bureaucratic obstacles faced by most foreign investors. This is intended to improve the investment climate in Algeria.

6. List of References

- al-Hamid, A. a.-M. (2003). *Economic Policies at the National Economy Level.* Egypt: Arab Nile Group.
- Ateyah M. A, T. M. (2015). The Impact Of The Fiscal And Quantitative Monetary Policies On The Domestic And Foreign Direct Investment In Jordan: An Empirical Study. *International Journal of Academic Research in Accounting, Finance and Management Sciences, Vol. 5, Issue.4*.
- Bouhassoun Hassani, M. A. (2019). , "The Impact of the Discount Rate on the Money Supply: The Case of the Bank of Algeria, A Standard Study Using the VAR Model for the Period 1990-2017. *Journal of Economic Insights, Volume 05, Issue 02*.
- Hashem Pesaran, R. j. (2001). Bound testing Approaches to the Analyses of level Relationship. *Journal of Applied Econometrics, John Wiley & Sons, Ltd., vol. 16(3)*.
- Houda Taaba, I. L. (2019). Obstacles of Foreign Investment in Algeria. *Journal of Legal and Political Studies, Volume 05, Issue 01*.
- Hussein, N. B. (2009). Analysis and Evaluation of the Investment Climate in Algeria . *Journal of Humanities, Volume 20, Issue 02*.

- Johansen, S. (1991). Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models. *Econometrica, Vol 59,Issue 6*.
- Mohammed Lahcen Allawi, K. B. (2015). The Impact of Monetary and Fiscal Policy on Foreign Direct Investment Inflows in Algeria: A Standard Study for the Period 1990-2012. *Journal of Economic Perspectives, Volume 05, Issue 9*.
- Noria Kaderi, F. Z. (2018). The Impact of Monetary and Fiscal Policy on Foreign Direct Investment in Algeria during the Period 1990-2016. *Global Journal of Economics and Business, Volume 05, Issue 02*.
- Sari, A. (2014). Monetary Policy in Algeria for the Period 2000-2013 . *Journal of Economic Perspectives, Volume 04, Issue 07*.
- Sims, C. A. ((Jan, 1980)). Macroeconomics and Reality. *Econometrica, Vol. 48,Issue. 1*.