

Macroeconomic determinants of economic growth in Mauritania: Empirical Study during the period (1991-2020)

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Abstract

This paper aims to examine the impact of Foreign Direct Investment, Infrastructure, Economic Openness, Inflation rate, Labor Force and Financial Development on Economic Growth in Mauritania during the period (1991-2020). The Autoregressive Distributed Lags model (ARDL) was employed through the statistic descriptive, correlation, and stationarity tests. The study's results found that economic growth lags, foreign direct investment inflows, financial development, economic openness, inflation rate and labor force plied an important role in influencing the Economic Growth during this period. While infrastructure did not play a major role in determining this economic Growth.

Keywords: macroeconomic, Determinants, Economy, Growth, Mauritania.

Classification JEL: E00 A01 B32

Paper type: Empirical Research

1. Introduction

Economic growth has remained a fundamental goal for the countries of the world in general and developing countries in particular. Therefore, money researchers and scholars have addressed the topic of economic growth extensively, both theoretically and empirically, and this is clearly evident through the conflicting theories and empirical studies related to this topic. In the theoretical framework, the neoclassicist tried to explain economic growth by establishing exogenous theories among themselves. The basic role played by physical capital in driving economic growth in the short-term and technological progress in the long-term (Solow-swan 1956), while others pointed to the importance of human capital in developing economic growth alongside physical capital (Mankiw, Romer and weli 1992, Islam ,1995).

In terms of endogenous growth theories, the focus was primarily on the importance of productivity factors such as learning by doing and useful technological knowledge (research and development) as a strong driver of economic growth (Romer 1986, 1990, Lucas 1988 Grossman and Helpman 1991. Aghion and Howiitt 1992, Stokey 1995).

There are others considered that the investment and the saving are key determinants of economic growth (Easterly and Wetzel 1989, Fisher 1992).

In the 1990s others based on factors of stability in macroeconomic and political environment as important determinants of economic growth (Pindyck 1988, Pindyck and Somalino 1993; Barro1990, Snowden and Vane 2005).

Regarding the empirical framework. Many researchers have attempted to explain the relationship between Economic growth and its determinants using a set of different variables (Foreign direct investment, Economic openness, infrastructure, financial development, inflation.....) and adopting a set of diverse methodologies (ARDL, OLS, VEC, GMM) based on time-series data and panel data.

These studies have reached conflicting results; the difference may be related to the country or geographical area under study.

Globally, global economic growth declined by 3.3% in 2020, after increasing to 2.8% in 2019. (BCM, 2020)

In developed countries, economic growth declined by 4.7% in 2020, compared to 1.6% in 2019. (BCM, 2020)

On the other hand, China achieved economic growth of 2.3% in 2020, compared to 5.6% in 2019, as a result of the effectiveness of the measures it took, the adoption of a strict public investment strategy, and the injection of significant amounts of liquidity into the banking system. (BCM, 2020)

In the Middle East and Central Asia, economic activity growth declined by 2.9% in 2020, compared to an increase of 1.4% in 2019. In Sub-Saharan Africa, economic growth declined by about 1.9%, compared to a 3.2% increase in 2019. (BCM, 2020)

In Mauritania, the growth rate has witnessed strong fluctuations due to the lack of diversity of its sources during the period from 1991 to 2020, reaching its highest level in 2006 (Where it arrived 18.33%) and its lowest level in 1997 (Where it arrived -4.04%).

Mauritania's economic growth rate declined to 2.2% in 2020, compared to 5.6% in 2019. The primary sector's contribution was 5.4% in 2020, compared to 11.3% in 2019, while the secondary sector declined by 0.1% and the tertiary sector by 2%. (BCM, 2020)

To understand these imbalances and their causes, the subject of this study is the determinants of Economic Growth in Mauritania from the period 1991 to 2020, will be addressed through the following axes of the first axis, which has been previously exposed, the second axis, previous literature, the third axis, Database and methodology specifications, the fourth axis is the analysis of the results, and the fifth axis is the conclusion.

2. Literature Review

Many researchers and scholars tried to explain the phenomena of economic growth through the publication of many empirical studies as shown:

Ali and Malik (2017) examined the short- and long-run effect of foreign direct investment in economic growth in Pakistan during the period (1976-2015), the autoregressive distributed lag model (ARDL) was used to check the nature of the relationship between the variables. The results reached that the FDI has a significant and positive effect on economic growth in the short-run.

Rahman (2014) investigated the effect of FDI on economic growth using the time series of Pakistan from the period 1981 to 2010. The multiple regression was applied. The results showed that the FDI had a significant and positive effect on economic growth, whereas the CPI had a significant and negative effect.

Kojaroenpasit (2012) analyzed the nexus between FDI and economic growth in South Korea using time-series data which comprises 1980 to 2009. The results of multiple regression showed an important and positive impact of FDI on economic growth. While the human capital, the export and the employment had a significant and positive effect.

Ghosh and Gregoriou (2008) studied the effect of current component of public spending on economic growth for a sample of 15 developing countries over 28 years. The results of GMM technique found that the current component of public spending has a significant and positive impact on economic growth.

Mihut and Lutas (2014) which used a complex dynamic panel method, showed that the degree of openness and human capital had a significant and positive effect on economic growth for the 12 new EU member states.

Sanga et al (2023) examined the effect of inflation rate on economic growth using time series in Tanzania from the period 1970 to 2020. The results of Vector Error Correction (VECM) found that a significant and positive effect of money supply, exchange rate and interest rate on economic growth in long-run, while that a significant and negative effect of inflation rate. Regarding in short run these results showed that money supply and interest rate had a significant and negative effect on economic growth, while the exchange rate had a significant and positive. Chang and Mendy (2012) tried to explain the empirical effect of openness on economic growth, employing panel data of 36 African countries during the period (1980 – 2009). The results of panel fixed effects regression showed that foreign aid, exports, imports, labor employed, and trade openness have a positive and significant impact on economic growth. However foreign direct investment, domestic investment and gross national savings have negative and significant impact.

Anyanwu (2014) presented a study targeting the factors affecting economic growth using panel data for African countries during the period 1996-2010 together with time series of China from the period 1984 to 2010 the cross-country panel regression results found that for Africa higher domestic investment , official aid , secondary school enrollment, metal prices index , government effectiveness (governance) and urban population have a positive and significant effects on economic growth . In China the results of subset regression reveal that domestic investment and trade openness have a significant and positive effect on economic growth, while official development aid, population growth, inflation, credit to the private sector, agricultural material price and oil price indices have negative and significant effect on economic growth

Martin Karim and al (2021) analyzed determinants of economic growth in Afghanistan employing time series economic growth, domestic investment, official development assistance or foreign Aid, export and import from the period 1970 to 2018. ordinary least square (OLS) was applied, the results found that domestic investment and import have significant and positive impact on economic growth in Afghanistan, while export has a significant and negative impact.

Bwana and Maharima (2025) studied the effect of the key financial variables on economic growth in Tanzania, using time-series data of G D P growth (explained variable), exchange rates, inflation rates, trade openness, and domestic credit to the private sector (explicative variables) from the period 1990 to 2022, Vector Error Correction model (V E CM) was applied. The results showed that the exchange rate and inflation rate have a significant and negative effect on economic growth, while the trade openness has a significant and positive effect on economic growth in Tanzania.

On the basis of the results of previous empirical studies, the following hypotheses can be formulated:

The First hypotheses: There is a significant effect of foreign direct investment and economic openness on economic growth in Mauritania

The Second hypotheses: There is a significant effect of labor force and infrastructure on economic growth in Mauritania

The Third hypotheses: There is a significant effect of inflation and financial development on economic growth in Mauritania

3. Research Methodology

For Determining the validity of the aforementioned hypotheses requires defining the variables used and their level of stationarity to be taken into account in order to prevent false results from being obtained in the Model followed. This will be discussed within the following:

3.1. Database

Annual time series were selected based on quality and availability criteria. In this contest, Data from the World Bank and National Office of statistics were used during the period (1991-2020), as shown the following table:

Table 1 Database and its resources

Variable	Proxy	Code	Resource
growth rate	growth rate	CR	World Bank database (1991-2020)
Foreign Direct Investment	Foreign direct investment inflows as a percentage of the gross domestic product	FDI	World Bank database (1991-2020)
Infrastructure	public spending as a percentage of the gross domestic product	DP	World Bank database (1991-2020)
Economic openness	Total exports and imports as a percentage of the gross domestic product	OP	World Bank database (1991-2020)
Inflation	Inflation Rate	INF	World Bank database (1991-2020)
Labor force	Enrollment rate in secondary education	LF	national statistics office database (1991-2020)
Financial development	money supply as a percentage of the gross domestic product	M2	World Bank database (1991-2020)

Source: World Bank and National office of statistic (1991-2020)

3.2. Model Specification

In this study, the Methodology of Autoregressive Distributed Lags (ARDL) developed by PESARAN in 2001 was employed after fulfilling its conditions to analyze the static and dynamic relationship between the used variables in order to identify the important macroeconomic determinants of economic growth in Mauritania during the period (1991-2020). Therefore, the following model will be evaluated:

ARDL($P, q_1, q_2, q_3, q_4, q_5, q_6$) :

$$CR_t = \alpha_0 + \sum_{j=1}^p \lambda_j CR_{t-j} + \sum_{i=0}^{q_2} \beta_{2i} FDI_{t-i} + \sum_{i=0}^{q_3} \beta_{3i} DP_{t-i} + \sum_{i=0}^{q_4} \beta_{4i} OP_{t-i} + \sum_{i=0}^{q_5} \beta_{5i} INF_{t-i} + \sum_{i=0}^{q_6} \beta_{6i} LF_{t-i} + \sum_{i=0}^{q_7} \beta_{7i} M2_{t-i} + E_t$$

where P is the optimal value of the dependent variable Lags (CR), while ($q_1, q_2, q_3, q_4, q_5, q_6$) respectively represents the optimal values of the independent variables Lags ($FDI, DP, OP, INF, LF, M2$). On the other hand, (α_0) represents the constant and (E_t) represents the error term.

4. Results and discussion

The ARDL Model calls for analyzing the results of several tests, which will be explained below:

4.1. Descriptive Statistic, Correlation and stationarity tests

To estimate the ARDL, it is necessary to make sure that a number of conditions are met by performing the following tests:

Table 2 Statistics Descriptive

	CR	FDI	DP	OP	INF	LF	M2
Mean	3.288723	5.436103	24.75358	76.00224	5.302714	27.30109	24.73183
Median	3.911996	3.866886	24.84542	81.64936	4.698101	25.70465	25.73000
Maximum	18.33320	27.65204	38.22335	110.7881	12.12565	49.81000	35.42909
Minimum	-4.044697	-11.19897	14.44496	42.32792	1.486007	14.09297	14.17000
Std. Dev.	4.556540	7.529122	5.689282	18.64028	2.666505	9.925347	5.764448
Skewness	0.927871	0.940911	-0.010359	-0.180612	0.852797	0.485141	-0.104841
Kurtosis	5.251147	4.579151	2.774858	1.881534	3.076004	2.230903	2.032800
Jarque-Bera	10.63931	7.543714	0.063898	1.726812	3.643534	1.916196	1.224304
Probability	0.004884	0.023009	0.968556	0.421723	0.161740	0.383622	0.542183
Sum	98.66170	163.0831	742.6074	2280.067	159.0814	819.0327	741.9548
Sum Sq. Dev.	6020996	1643.943	938.6700	10076.34	206.1972	2856.863	963.6369
Observations	30	30	30	30	30	30	30

Source: Eviews2012 results

The table above shows the measures of central tendency and dispersion of variable used and its Skwness and Kurtosis.

Table 3 Correlation Matrix

	FDI	CR	DP	OP	INF	LF	M2
FDI	1						
CR	0.18	1					
DP	0.45	0.19	1				
OP	0.49	0.18	0.28	1			
INF	0.53	0.33	0.06	0.18	1		
LF	0.16	0.06	0.01	-0.08	-0.18	1	
M2	0.19	-0.05	0.33	-0.14	0.10	0.20	1

Source: Eviews2012 result

It is clear from the previous table that the correlation coefficients did not exceed ,0.53. which indicates that there is no strong correlation between the variables used.

Table 4 Stationarity test

Variable	Probability at level I(0)			Probability at first difference I(1)			Stationarity level
	I	IT	N	I	IT	N	
Economic growth rate	0.0008	0.0020	0.0003	-	-	-	I(0)
Foreign Direct Investment	0.0097	0.0220	0.0091	-	-	-	I(0)
Infrastructure	0.5861	0.7420	0.2042	0.0000	0.0016	0.0006	I(1)
Economic openness	0.5517	0.4863	0.7740	0.0010	0.0050	0.0001	I(1)
Inflation Rate	0.0004	0.0396	0.0083	-	-	-	I(0)
Labor force	0.0294	0.3006	0.2314	0.0001	0.0030	0.0157	I(1)
Financial development	0.0005	0.0089	0.0255				I(0)

Source: Eviews2012 result

The results of the previous table indicate that the variables (INF, M2, FDI, CR,) are static at level I(0), while the remaining variables (DP, OP, LF) are static at the first difference, I(1), which allows the use of an autoregressive distributed Lags model (ARDL).

4.2. Model Estimation and its Quality

After ensuring that the conditions for applying the model are met, it must be evaluated to determine the nature of the relationship between the variables and the extent of their credibility through:

Table 5 Model Estimation

Dependent Variable: CR				
Selected Model: ARDL(2, 1, 0, 0, 1, 1, 1)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
CR(-1)	-0.203399	0.153557	-1.324580	0.2051
CR(-2)	-0.384779	0.152540	-2.522479	0.0234
FDI	-0.405195	0.143417	-2.825295	0.0128
FDI(-1)	0.150096	0.128200	1.170795	0.2599
DP	0.405103	0.210953	1.920344	0.0740
OP	0.081901	0.048483	1.689267	0.1118
INFT	1.215129	0.431918	2.813332	0.0131
INFT(-1)	0.804297	0.424733	1.893654	0.0777
LFT	0.517568	0.239493	2.161098	0.0473
LFT(-1)	0.346724	0.271151	1.278712	0.2204
M2T	-0.774012	0.315164	-2.455904	0.0267
M2T(-1)	0.400867	0.289595	1.384234	0.1865
C	-9.798363	6.177564	-1.586121	0.1336

Source: Eviews2012 result

It is clear from the table below that economic growth at the first lag has a positive and significant impact on economic growth in Mauritania during the period (1991-2020), foreign direct investment has a negative and significant on economic growth in Mauritania during the period (1991-2020), this result agreed with Sanga et al (2023) reached and differed with Rahman (2014) and Kojaroenpasit (2012) reached trade openness has a positive and significant impact on economic growth in Mauritania during the period (1991-2020), this result agreed with Mihut and Lutas (2014), Sanga et al (2023) and Anyanwu (2014) reached inflation rate has positive and significant impact on economic growth in Mauritania during the period (1991-2020), this result differed with Rahman (2014) and Anyanwu (2014) reached labor force has

positive and significant impact on economic growth in Mauritania during the period (1991-2020), this result agreed with Kojaroenpasit (2012) , Mihut and Lutas (2014), Sanga et al (2023) and Anyanwu (2014) reached . Financial development has a negative and significant on economic growth in Mauritania during the period (1991-2020), this result differed with Sanga et al (2023) reached and agreed with Anyanwu (2014) reached.

Table 6 Model Quality

R-squared	0.767041	Mean dependent var	3.392839
Adjusted R-squared	0.580675	S.D. dependent var	4.704384
S.E. of regression	3.046340	Akaike info criterion	5.370176
Sum squared resid	139.2028	Schwarz criterion	5.988699
Log likelihood	-62.18246	Hannan-Quinn criter.	5.559264
F-statistic	4.115762	Durbin-Watson stat	2.292976
Prob(F-statistic)	0.005833		

Source: Eviews2012 result

It is noted from the table above that the R-squared and Adjusted R-squared reached 0.767041, 0.580675 respectively and its values are close to one, while the probability value of fisher's statistic reached 0.005833, which indicates explanatory power of the model and significance at the level of 1%.

On the other hand, the value of the Durbin Watson (DW) statistic was about 2.292976, which indicates that there is no autocorrelation between errors.

4.3. Diagnostic Coefficients

Diagnostic Coefficients allow determining the time dimension of the relationship and ensuring its equilibrium, in addition to the existence of a mechanism for error correction in the model, in the following manner:

Table 7 ARDL Long Run Form

ARDL Long Run Form and Bounds Test				
Dependent Variable: D(CR)				
Selected Model: ARDL(2, 1, 0, 0, 1, 1, 1)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI	-0.160624	0.137157	-1.171098	0.2598
DP	0.255074	0.139622	1.826887	0.0877
OP	0.051569	0.028512	1.808683	0.0906
INFT	1.271537	0.354077	3.591128	0.0027
LFT	0.544203	0.171771	3.168197	0.0064
M2T	-0.234951	0.191254	-1.228477	0.2382
C	-6.169562	3.961185	-1.557504	0.1402

Source: Eviews2012 result

It is clear from the previous table in the long run that inflation rate has significant and positive impact on economic growth in Mauritania during the period (1991-2020), labor force has a significant and positive impact on economic growth in Mauritania during the period (1991-

Table 8 Bunds test

F-Bounds Test				
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	8.658475	10%	1.99	2.94
K	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Source: Eviews2012 result

As for Fisher Bounds Test, the results of the above table. Showed support rejecting the hypothesis of the absence of any relationship levels because the calculated value of F reached 8.658475, which is more than the upper limit of the critical value, which reached 3.99 at a significant level of 1%, which indicates the presence of an equilibrium relationship between the studied determinants and economic growth in Mauritania during the period (1991-2020).

Table 9 Short-Run relationship and ECM

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CR(-1))	0.384779	0.115432	3.333368	0.0045
D(FDI)	-0.405195	0.067920	-5.965787	0.0000
D(INFT)	1.215129	0.248168	4.896401	0.0002
D(LFT)	0.517568	0.159664	3.241606	0.0055
D(M2T)	-0.774012	0.169987	-4.553348	0.0004
CointEq(-1)*	-1.588178	0.157568	-10.07932	0.0000

Source: Eviews2012 result

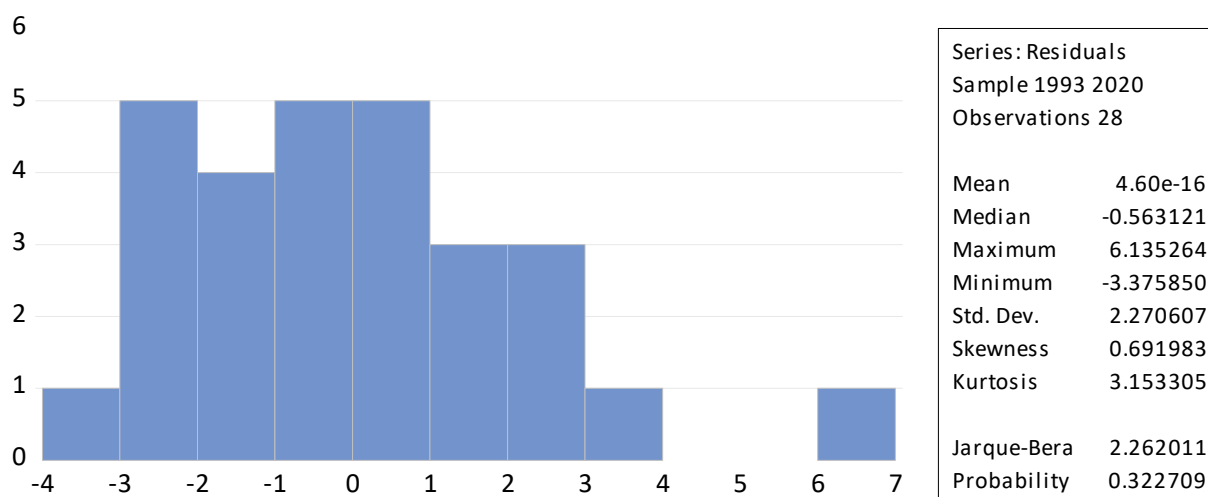
It is clear from the previous table in the short run that the economic growth at the first level has a significant and positive impact on economic growth in Mauritania during the period (1991-2020), foreign direct investment has a significant and negative impact on economic growth in Mauritania during the period (1991-2020), this result differed with Ali and Malik (2017) reached: inflation rate has a significant and positive impact on economic growth in Mauritania during the period (1991-2020), labor force has a significant and positive impact on economic growth in Mauritania during the period (1991-2020), financial development has a significant and negative impact on economic growth in Mauritania during the period (1991-2020).

Error correction mechanism: It is noted from the above table that the value of the error correction coefficient appeared negative ($\lambda = -1.588178$) and significant at 1%, which suggest the existence of a long-term equilibrium relationship, and a mechanism for error correction in the model. And this contest can be said that 158,8178% of the deviations and differences in the balance of economic growth in a previous year are corrected in the current year in Mauritania during the period (1991-2020).

4.4. Diagnostic Residuals

Diagnostic residuals make it possible to verify that they meet the required conditions for the model, according to the following:

Fig.1. Normality Test



Source: Eviews2012 result

It is clear from the above figure that the Jarque-Bera probability value is equal to 0.64, which is greater than 5%, which indicates the acceptance of the null hypothesis H_0 which states that the residuals are normally distributed.

Table 9 Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	0.740380	Prob. F(2,13)	0.4960
Obs*R-squared	2.863198	Prob. Chi-Square(2)	0.2389

Source: Eviews2012 result

It is clear from the above table that the probability value is 0.4960, which is greater than 5%, which indicates the acceptance of the null hypothesis that there is no serial autocorrelation for the residuals.

Table 10 Heteroskedasticity Test

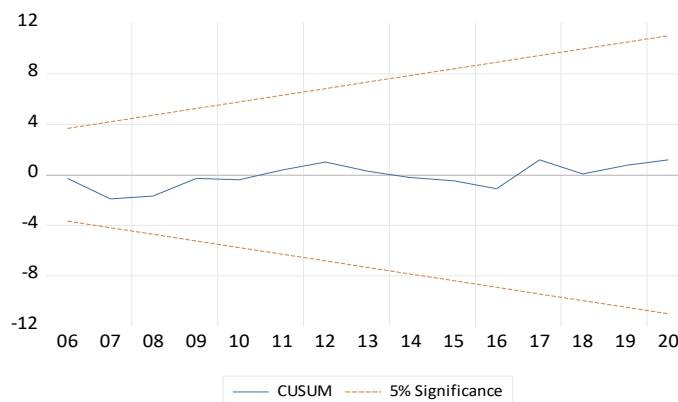
Heteroskedasticity Test: ARCH			
F-statistic	0.018613	Prob. F(1,25)	0.8926
Obs*R-squared	0.020087	Prob. Chi-Square(1)	0.8873

Source: Eviews2012 result

It is clear from the table below that the probability value is 0.8926 and this value is greater than 5% Which indicates the acceptance of the homogeneity of the variance of error terms.

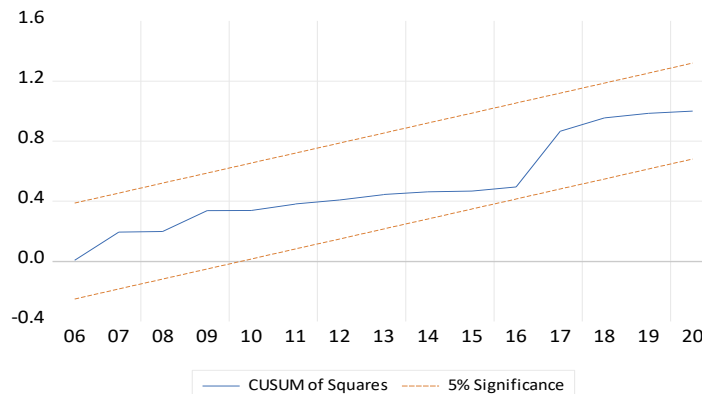
4.5. Model Stable

Fig.2. Diagnostic stability



Source: Eviews2012 result

Fig.3. Diagnostic stability



Source: Eviews2012 result

It is clear from the above figures that the graphic curve of the tests of the cumulative sum of residuals and cumulative sum of squared residuals (the blue curve) are located within the limits of the critical regions at significant levels of 5%, which means that all variables used in the model are stable during studied period and that the coefficients in the short and long term are consistent with each other.

5. Conclusion

This paper aimed to determine the impact of Foreign Direct Investment, infrastructure, economic openness, inflation rate, labor force and financial development on economic growth in Mauritania from the period 1991 to 2020 employing Autoregressive Distributed Lags model (ARDL) through the statistic descriptive, correlation and stationarity tests. Its results revealed that economic growth lags, foreign direct investment inflows, financial development, economic openness, inflation rate and labor force played an important role in influencing the Economic Growth during this period. While infrastructure did not play a major role in determining this Economic Growth. The model estimation found that the economic growth of the second lag, foreign direct investment and financial development had a significant and negative effect on economic growth, which proves the validity of the first and third hypotheses. While economic openness, inflation rate and labor force had a significant and positive effect on economic growth, which proves the validity of the first, third and second hypotheses.

The diagnostic coefficient tests showed that the inflation rate and labor force had a significant and positive effect on economic growth in long-run, which proves the validity of the third and second hypotheses. In short-run the results reached that the economic growth at the first lag, inflation rate and labor force had a significant and positive effect on economic growth, which proves the validity of the third and second hypotheses. While foreign direct investment and financial development had a significant and negative effect on economic growth, which proves the validity of the first and third hypotheses.

The negative effect of foreign direct investment in economic growth in Mauritania may be attributed to the weak link between the local and foreign private sectors and the lack of qualified labor force in terms of quantity and quality. In addition to the failure to keep pace with rapid and continuous technological development.

In order to improve economic growth rates and diversify its sources, the Mauritanian authorities must take a series of measures, primarily restricting the financial sector to improve its performance in order to provide liquidity and financing for the economy, in addition to attracting more investments towards the agricultural, industrial and service sectors, Involving local and foreign investors in training and education plans to provide a sufficient amount of labor force, both in terms of quantity and quality, providing economic stability by controlling inflation and the exchange rate, and creating a physical and technological infrastructure to reduce production costs.

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