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The impact of macroeconomic variables on foreign direct investment in Nigeria

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Abstract

This study's main goal is to determine the effect that specific macroeconomic factors have on the amount of foreign direct investment (FDI) flowing into Nigeria. The ex post facto research design was adopted, and it used exchange rate, inflation rate, monetary policy rate (MPR), and gross domestic product growth (GDP) rate as the macroeconomic variables. The quantity of inflow between 1986 and 2020 was made up of FDI (dependent variable). Because the model variables were integrated in a mixed order of both level and first difference, the autoregressive distributed lag (ARDL) technique was used. The selected macroeconomic variables and FDI were bound by a long-run connection, according to the results of the ARDL bounds test for cointegration. The calculated short-run coefficients showed that GDP growth rate and monetary policy rate were the primary macroeconomic variables that considerably increased FDI inflow in Nigeria, whereas inflation and exchange rate were the major macroeconomic variables that significantly decreased FDI inflow. In the long term, the GDP growth rate and the exchange rate had a beneficial influence on FDI influx, whereas the monetary policy rate had a large negative effect. According to these empirical findings, it is advised that Nigeria's monetary authorities should support strong GDP growth, exchange rate stability, and efficient monetary policy rates in order to draw FDI into the country and create efficient foreign exchange policies that will attract foreign investors.

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1. Introduction

Foreign direct investment (FDI) can play a key role in boosting global capital flows, which are essential for boosting domestic resources in developing nations' growth and development processes and bridging the savings and investment gaps (Adebayo, Onyibor, & Akinsola, 2021). It is clear that developing and less developed nations rely heavily on the financial support of their more developed counterparts in the form of FDI inflows that would help them reach and maintain a certain level of economic stability. By making investments in these nations, economically developed nations may support and strengthen these less developed and growing economies. Through collaboration with the host nation, this financial aid can be directed toward various economic sectors. It is the responsibility of the host nation to provide an environment that is conducive to investment and free from risks and unfavorable economic regulations that can deter potential investors. It is also crucial to keep in mind that domestic private sector companies frequently lack the financial resources to carry out certain types of

investments in their nation and frequently rely heavily on foreign businesses or individuals to complete these types of investments, which require significant capital outlay (Emenuga, 2019). Apart from the need for large capital investments to finance specific projects or ventures, indigenous investors favor investments that produce income quickly and may even require less cash; FDI is essential in this situation.

The introduction of FDI has a number of positive effects on an economy, including increased capital inflows that will strengthen the host nation's balance of payments, an increase in exports, a swift transfer of technology, new management techniques, and an increase in the employment rate (Karau & Ng'ang'a, 2019; Ndubuisi, 2017). Oloyede and Kolapo (2018) pointed out that FDI has been booming in developing nations since 1990, helping to promote industrialization, growth, and development. In order to understand the dynamics of international business in the global economy in the years leading up to the millennium, it is interesting to compare the growth trends of trade and investment. FDI is on the rise, which supports development by increasing productive resources, bridging the technical divide, and overcoming capital constraints.

According to previous research, nations with minimal investment risk and macroeconomic stability, including stable prices, rapid GDP growth, little fluctuation in exchange rates, and moderate interest rates, are more appealing to international investors.

A detailed examination of the situation in Nigeria reveals a significant degree of macroeconomic volatility brought on by multiple shocks to the aforementioned macroeconomic variables. For instance, the recent drop in oil prices, which was brought on by the collapse in the price of a barrel of oil globally, has significantly reduced Nigeria's external reserves and GDP growth rate, both of which have led to a high rate of inflation and a decline in the purchasing power of the naira, which has resulted in exchange rate instability in the nation and is not desirable for foreign investors. According to an OECD analysis, domestic macroeconomic fluctuations are to blame for a significant decline in foreign direct investment in developing nations such as Nigeria (Organization for Economic Co-operation and Development, 2019). There have been numerous studies done on the effects of macroeconomic factors on FDI in Nigeria. According to Emenuga (2019), real exchange rates, interest rates, inflation, and money supply (M3) shocks all have large and long-lasting effects on foreign direct investment. Inflation and prime lending were also discovered by Adebayo et al. (2021) to be inversely associated with Nigerian economic growth. Additionally, Onakoya (2016) discovered that the current money supply, interest rates, inflation, and exchange rates have prevented FDI from entering Nigeria. According to Karau and Ng'ang'a (2019), debt servicing, the growth of financial and human resources, and exchange rates were key factors of foreign direct investment in Kenya. Among other studies on the topic are Ukachukwu and Odionye (2020); Şıklar and Kocaman (2018); and Kwoba and Kibati (2016), all of which established a substantial association between macroeconomic dynamics and FDI but did not identify any specific factors that have the greatest influence. Although various studies have found that factors such as GDP, interest rates, inflation, and exchange rates had an impact on the rate of economic growth, the scale of these impacts vary among the works.

The impact of macroeconomic variables and infrastructure spending on FDI between 1981 and 2018 was examined by Wijaya, Astuti, Tarigan, and Edyanto (2020). The methodology for their investigation was quantitative, and gross domestic product, the exchange rate, the debt to GDP ratio, the inflation rate, interest rates, and infrastructure spending are among the variables utilized. Cointegration and error correction modeling were used by the researchers as estimation methodologies, and the findings indicate that every variable has a long- and short-term link with FDI.

In 2020, Artantaş and Sipahi (2020) looked at the impact of a few macroeconomic factors on the flow of investments in Turkey in the literature and how Nigeria and other nations respond differently and at different times to the fluctuations in the macroeconomic environment. This explains why authors from various nations focused on a variety of macroeconomic indicators and produced mixed results. This study's main aim is to objectively and empirically examine how macroeconomic factors affect FDI in Nigeria.

2. Theoretical Foundation

Eclectic theory is the foundation of this subject. Dunning (2000) asserts that corporations engage in foreign direct investment when a location's characteristics are combined with ownership and internationalization benefits to make the area desirable for investment. Nigeria's strong connectivity with the majority of the continent and the rest of the world has made it a popular location for foreign direct investment. This is because of her geographic location, particularly the Apapa Seaport and oil-producing zones, which are favored by the majority of investors as trustworthy and secure in all other aspects. Given the costs involved, transportation is one of the crucial elements of business.

3. Literature Review

Ukachukwu and Odionye (2020) examined the effects of specific macroeconomic factors on foreign direct investment in Nigeria from 1981 to 2017. To examine the immediate and long-term impacts of the selected factors on FDI, the researchers utilized the ARDL bounds cointegration model. The findings demonstrated a long-term relationship between foreign direct investment and specific macroeconomic variables in the country. The ARDL model's findings demonstrated that over the long and short terms, both the foreign exchange rate and the price of crude oil had a significant positive impact on FDI in the nation. The outcome also showed that

in the short and long terms, inflation had a considerable negative influence on FDI. The findings also showed that while real gross domestic product had a considerable short-term beneficial impact on FDI, its long-term impact was modest. The researchers suggested that the government should create policies to promote price stability and stability in the macroeconomic environment in light of the empirical findings.

This study also concentrated on FDI inflows and how they relate to Turkey's economic metrics, such as the real effective exchange rate (REER) and the GDP per capita of purchasing power parity (PPP). The Central Bank of Turkey's statistical bulletin was used to gather data from 1994 to 2018. Exchange rates, inflation, interest rates, and the government deficit were among the variables analyzed. The results showed that all the explanatory factors together had an impact on the inflow of foreign direct investment. In Turkey, FDI is significantly favorably influenced by the government deficit and exchange rates. Therefore, by paying closer attention to the highlighted macroeconomic policy variables, the government should develop solid policies that enhance the attraction of foreign direct investment inflow into Turkey.

Meftah and Nassour (2019) looked at the variables that affect FDI. The study demonstrates that there is a long-term causal relationship between exchange rates and inflation with FDI using the vector error correction model. However, there are no factors that have an immediate impact on FDI. Additionally, the Granger causality test demonstrates that GDP and FDI have a causal relationship, whereas other variables do not. The findings of this study have significance for how policymakers should increase the flow of FDI by paying attention to macroeconomic factors.

In 2019, Karau and Ng'ang'a (2019) looked at how macroeconomic factors affected foreign direct investment in Kenya (FDI). Using data from 1970 to 2010, the study used five macroeconomic variables: foreign exchange rates, tax rates, inflation rates, interest rates, and balance of payments.

Adebayo et al. (2021) used annual data ranging from 1981 to 2018 to examine the associations between FDI inflows and a few selected macroeconomic metrics (exports, gross capital creation, trade openness, inflation, and economic growth). Nigeria was used as a case study. The study employed the ARDL technique to capture the correlations between FDI inflows and their determining factors. Techniques for wavelet coherence were also used. The main contribution of wavelet coherence is the capacity to collect information on dynamic correlation and/or causality between economic variables at different frequencies and over different time scales. The fully modified ordinary least squares (FMOLS) and the dynamic ordinary least squares (DOLS) were also utilized as a robustness check for the ARDL long-run estimation. The findings of the ARDL long-run estimate demonstrate that exports and trade openness have a positive impact on FDI inflows. The findings of the FMOLS and DOLS confirmed those of the ARDL. The results of the wavelet coherence-based causality and wavelet correlation approaches offer additional proof in favor of the ARDL technique. To the best of our knowledge, this is the first study to analyze these dynamics using wavelet coherence and wavelet correlation. Policy recommendations were made as a result of these findings.

Emenuga (2019) looked at the effects of macroeconomic factors on the flow of FDI into Nigeria from 1986 to 2017. The CBN Annual Report served as the source for information on foreign direct investment (FDI), gross domestic product (GDP), government size (GOVT), exchange rate (EXR), inflation rate (INF), and interest rate (INT). Techniques for estimating the error correction model and the ARDL cointegration bounds test were used. The results of the ARDL showed that FDI in Nigeria was highly influenced by the currency rate, interest rate, GDP, and government size. The study found a long-term association between macroeconomic factors and foreign direct investment in Nigeria and suggested that the Nigerian government should support economic policies that would draw in more foreign direct investment.

Through the use of the structural vector autoregressive (SVAR) model, Siklar and Siklar (2022) examined the effects of FDI on the macroeconomic dynamics of the Turkish economy. The outcomes of the economic theory show that FDI has a favorable impact on domestic investment volume and economic growth. The findings also support the tenet of economic theory that local and international investments complement one another. It is acknowledged that FDI increased pricing pressure to some extent, but the monetary authority's measures offset this. While FDI does not considerably contribute to the decline in unemployment, it does greatly increase imports, particularly of capital goods.

Said and Umar (2022) found that the majority of African nations experience difficulty attracting FDI, and Nigeria in particular is one of these nations. The impact of foreign direct investment on macroeconomic variables (exchange rate, inflation rate) in Nigeria was empirically explored in this study over a five-year period (2017–2021). The generalized autoregressive conditional heteroscedasticity (GARCH) model was used in the study. A pre-diagnostic is the first condition for estimating GARCH, and this is where the econometric study began. The properties of the time series variables were investigated and tested using the augmented Dickey–Fuller (ADF) unit root test. The outcome of this experiment showed that the variables of foreign direct investment, currency rate, and inflation rate were stationary at either level I or at first difference I(I) (0). The GARCH model found that while inflation has a negative impact on exchange rates, FDI has a favorable impact. Based on this, the study suggested that in order to attract the FDI required to boost growth in macroeconomic variables, Nigeria should implement a proper regulatory framework that will be conducive to conducting business.

Ugonna and John (2022) empirically investigated the association between FDI and economic growth in Nigeria between 1990 and 2021 based on the traditional FDI concept. While oil-related foreign direct investment (OFDI) and non-oil related foreign direct investment (NFDI) were used as stand-ins for the study's

explanatory variable, FDI and GDP were used as stand-ins for the study's dependent variable, which was economic growth in Nigeria. The Central Bank of Nigeria's statistical bulletin served as the source for the study's secondary data. The analysis employed a stationarity test, the ordinary least squares (OLS) method was used for the short-run analysis, and the Johansen cointegration test was used for the long-run study. The results are as follows: NFDI and economic growth in Nigeria have a positive and negligible association, but OFDI and economic growth in Nigeria have a negative and negligible link. A positive and strong correlation exists between FDI and economic growth in Nigeria. The results highlight that although there is a long-term correlation between FDI and economic growth in Nigeria, there is no direct causal linkage between the two. FDI has a big impact on Nigeria's economic growth in the short run. Lastly, the report made a number of recommendations to aid the expansion of Nigeria's economy.

4. Analysis and Findings

Equation 1 provides the functional relationship of the model.

$$FDI = f(GDP, EXR, INF, MPR) \quad (1)$$

The form of each variable is a logarithm. Based on its benefits over competing models, the ARDL model was chosen. In order to examine if the model's variables have a long-term relationship, the ARDL model, which uses a limits test approach based on the error correction model (ECM), was applied. The key benefit of this strategy, which was also used by Pesaran, Shin, and Smith (2001), is that it may be implemented regardless of whether the variables are integrated of order I(0), I(1), or a combination of both. This enables the model to choose an adequate number of delays to capture the cointegration among the variables.

In order to prevent erroneous regression results, the stationarity levels of the variables were first tested using the augmented Dickey–Fuller (ADF) test. Table 1 shows that, with the exception of inflation (INF), all explanatory variables are stationary after the first difference, indicating that only INF was integrated of order zero, I(0), while FDI, GDP, EXR, and MPR were all integrated of order one, I(1) (0). As a result, the estimation was conducted using the ARDL bounds test method, which is advised by Pesaran et al. (2001) for situations where the variables are integrated of orders I(0) and I(1). After twenty models were generated automatically, ARDL(3, 3, 1, 1, 2) was chosen based on the Akaike information criterion (AIC).

Table 1. ADF test results.

Variable	ADF test statistic		ADF critical values		Order of integration
	Level I(0)	1st diff. I(1)	1%	5%	
FDI	-2.65	-10.6	-4.25	-3.54	I(1)
GDP	-0.91	-3.63	-4.25	-3.54	I(1)
EXR	-2.55	-6.01	-4.25	-3.54	I(1)
INF	-4.68	--	-4.25	-3.54	I(0)
MPR	-3.29	-6.99	-4.25	-3.54	I(1)

Each of the variables must be integrated to an order of one, zero, or both in order to test the ARDL bounds. The ARDL bounds test was used since the variables are integrated in a mixed order of I(0) and I(1). In contrast to the option that they are cointegrated, the null hypothesis for the bounds test is that the variables are not cointegrated. If the F-statistic is greater than the upper bound critical values at the selected level of significance, the decision rule is to accept the null hypothesis. Table 2 shows the results of the ARDL test.

Table 2. ARDL bounds test.

Test statistic	Value	Sig.	I(0)	I(1)
F-statistic	5.01	10%	2.2	3.09
K	4	5%	2.56	3.49
		1%	3.29	4.37

Table 2 reveals that the F-statistic, which is bigger than the I(1) upper bound of 4.37 at the 1% level of significance, is 5.014388. The analysis concludes that there is a long-term relationship in the model and therefore the null hypothesis is rejected. This suggests that FDI, and particularly the macroeconomic variables of GDP, EXR, INF, and MPR, in Nigeria have a cointegrating connection.

Given the long-term association between FDI and particular macroeconomic factors, Tables 3 and 4 contain the findings of the short-run and long-run estimates of the ARDL regression, respectively.

According to Table 3, the estimated coefficient of the past value of FDI is statistically significant and negative, indicating that the immediate past status of FDI had a negative impact on the current value of FDI. In other words, FDI's past worth defines its current value.

The calculated GDP lag one and exchange rate (EXR) coefficients were positive and statistically significant, indicating that changes in the exchange rate and economic output draw FDI into Nigeria. This is in line with the a priori anticipation that FDI will increase in the future since exchange rate depreciation makes it more affordable and desirable to invest in the host economy. In the case of GDP, it is implied that a consistent rise in

economic output will speed up aggregate demand and, in turn, attract FDI. This finding is consistent with those made by Ukachukwu and Odionye (2020); Emenuga (2019) and Oloyede and Kolapo (2018), who found that economic growth and exchange rate depreciation drive foreign direct investment into Nigeria.

Table 3. Short-run estimates and error correction mechanism (ECM).

Variable	Coefficient	Std. error	T-statistic	Prob.
DLOG(FDI(-1))	-0.37	0.14	-2.71	0.01
DLOG(FDI(-2))	-0.23	0.12	-1.81	0.08
DLOG(GDP)	0.29	0.56	0.51	0.61
DLOG(GDP(-1))	2.33	0.63	3.67	0.00
DLOG(GDP(-2))	1.99	0.75	2.65	0.01
D(EXR)	0.64	0.19	3.19	0.00
D(INF)	-0.18	0.07	-2.31	0.02
DLOG(MPR)	-0.44	0.25	-1.75	0.09
DLOG(MPR(-1))	0.43	0.23	1.86	0.07
ECM(-1)	-0.97	0.16	-6.16	0.00
R-squared	0.82			
Adjusted R-squared	0.77			
Durbin–Watson stat.	2.16			

The monetary policy rate (MPR) had a considerable and favorable impact on FDI as well as a minor, negative impact. The implication here is that Nigeria's regular use of monetary policy manipulation to control macroeconomic processes has mostly failed to attract FDI. According to earlier empirical investigations, the recipient country's inconsistent monetary policy is mostly responsible for this conclusion (Nwokoye & Oniore, 2017). This suggests that nations with contradictory monetary policies might not attract foreign investors.

As anticipated, inflation had a considerable, negative impact on FDI in Nigeria. This suggests that an increase in inflation would result in a drop in FDI as investment decisions become more challenging and unpredictable. This outcome confirms the findings of Ndubuisi (2017), who investigated the factors affecting foreign direct investment in Nigeria. Among other things, their findings indicated that inflation was a significant factor affecting FDI in Nigeria.

The ECM (-1) coefficient is (-0.97) and is properly marked. This rate of adjustment suggests that macroeconomic variables such as GDP, EXR, INF, and MPR annually correct 97% of the FDI disequilibrium from the preceding year. The implication is that it will take around a year for certain macroeconomic dynamics to remedy any FDI disequilibrium. The coefficient of multiple determination is 0.772952, indicating that approximately 77.2% of the variations in FDI is explained by the explanatory variables (selected macroeconomic variables) in the model. This further indicates the good explanatory power of the empirical model.

Table 4. Long-run estimates.

Variable	Coefficient	Std. error	T-statistic	Prob.
LOG(GDP)	0.43	0.17	2.59	0.01
LOG(EXR)	0.69	0.24	2.89	0.00
LOG(INF)	0.04	0.08	0.49	0.63
LOG(MPR)	-1.64	0.37	-4.42	0.00
C	1.65	1.47	1.11	0.27

The long-run estimates in Table 4 shows that GDP, exchange rate and inflation have positive and significant effects on FDI in the long-run, while MPR has a negative effect. GDP, EXR and MPR have a statistically significant effect on FDI in the long-run, while INF did not exert a significant effect on FDI in the long run in Nigeria.

Table 5. Diagnostic and stability tests.

Test	F-statistic	Prob.
Breusch–Godfrey serial correlation LM test	2.02	0.16
Breusch–Pagan–Godfrey heteroskedasticity test	0.84	0.61
Ramsey RESET test	0.78	0.43
Normality test	1.44	0.48

The diagnostic tests (see Table 5) looked at the serial correlation in the residuals produced by the models, as well as the Ramsey model specification test, heteroskedasticity test, stability test, and normality test. The Breusch–Godfrey LM test for autocorrelation served as the foundation for the serial correlation tests of the residuals. The results of the second order tests show that the model contains no proof of serial correlation.

Additionally, neither the Harvey heteroskedasticity test nor the Ramsey RESET test results revealed any sign of an omitted variable issue in the results. The normality test confirms that the residual was normally distributed.

5. Conclusion and Recommendations

This study used the ARDL model to determine the effects of specific macroeconomic variables on FDI in Nigeria. According to the empirical results, GDP and exchange rates had positive, statistically significant effects on FDI over the long and short terms. Additionally, it showed that while inflation has a short-term, negative, and large impact on FDI, it eventually becomes positive and inconsequential. On the other hand, MPR has a short-term, negative, and large impact on FDI, although this impact is negligible over time. The empirical data obtained in this study is sufficient to claim that macroeconomic factors significantly influenced foreign direct investment in Nigeria over the course of the study period.

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