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# Effect Of Foreign Direct Investment On Telecommunication Output In Nigeria

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**ABSTRACT**
The study examined the effect of foreign direct investment on Telecommunication Output in Nigeria. The objectives of the study were to: determine the effect of domestic investment on telecommunication output in Nigeria; evaluate the effect of private sector credit on telecommunication output in Nigeria; determine o the effect of exchange rate telecommunication output in Nigeria. The study was anchored on Endogenous Growth Theory. The expost facto research design approach was applied. The variables were telecommunication output as the dependent variable while domestic investment, private sector credit and exchange rate were the independent variables. These variables were sourced from the Central Bank of Nigeria bulletin. Secondary type of data were utilized in this study, error correction model approach was employed for the analysis. The study found that private sector credit has insignificant positive effect on telecommunication output in Nigeria. The study found that exchange rate has significant effect on telecommunication output in Nigeria and private sector credit has insignificant positive effect on telecommunication output in Nigeria. The study concludes that foreign direct investment has significant positive effect on telecommunication output. The study recommends that, The government should encourage greater domestic investment in the telecommunication sector through supportive policies, public-private partnerships, and investment incentives. Financial institutions should expand access to affordable credit facilities for telecommunication firms and related businesses. Improved credit accessibility and favourable lending conditions may enhance its contribution to sector growth.
**Keywords:** domestic investment, private sector credit and exchange rate, telecommunication sector output, foreign direct investment

## 1.1 INTRODUCTION

The telecommunications sector has become one of the most dynamic and strategic sectors of the Nigerian economy, contributing significantly to economic growth, employment generation, technological innovation, and digital transformation (Adegboye & Osabuohien, 2020). Since the liberalization of the

sector in 2001, Nigeria has experienced remarkable expansion in telecommunication services, driven by the entry of multinational telecommunications firms through Foreign Direct Investment (FDI). The influx of foreign capital has facilitated improvements in network infrastructure, technology transfer, service delivery, and increased competition among service providers. Consequently, the telecommunications sector has emerged as one of the largest contributors to Nigeria's Gross Domestic Product (GDP) outside the oil sector (Adelakun, Folorunso & Olusanya, 2021).

Foreign Direct Investment (FDI) refers to cross-border investments in which investors acquire a lasting interest and significant managerial control in enterprises operating in another country. FDI provides host economies with financial resources, advanced technology, managerial expertise, and access to international markets, all of which are essential for enhancing productivity and sectoral output (Ajiboye & Adebayo, 2022). According to the endogenous growth theory, FDI contributes to long-term economic growth by increasing capital accumulation, facilitating technological innovation, and improving the efficiency of production. For developing countries like Nigeria, attracting sustained FDI has become an important strategy for addressing infrastructural deficiencies and promoting sectoral development, particularly in capital-intensive industries such as telecommunications (Egome, Ezirim & Mgbeoji, 2024).

Nigeria's telecommunication industry has witnessed tremendous growth over the past two decades, with millions of subscribers gaining access to mobile and internet services. The sector has attracted substantial foreign investments from multinational companies, leading to improvements in broadband penetration, mobile connectivity, digital financial services, and electronic commerce (Fatomilola & Ajayi, 2022). Despite these achievements, the sector continues to face numerous challenges, including inadequate infrastructure, inconsistent government policies, exchange rate volatility, high operational costs, and limited domestic financing. These challenges have raised concerns regarding whether FDI alone is sufficient to sustain improvements in telecommunication output or whether complementary macroeconomic factors are equally important (Lawrence, Adebisi & Yusuf, 2021).

One important factor influencing telecommunication output is domestic investment. While foreign investment provides external financial resources, domestic investment complements these resources by expanding local infrastructure, promoting indigenous entrepreneurship, and strengthening supporting industries. Increased domestic investment in communication infrastructure, fibre-optic networks, power supply, and digital technologies enhances the productive capacity of the telecommunications sector (Nkoro & Iortim, 2022). Another critical determinant is private sector credit. Access to adequate credit enables telecommunication firms and related businesses to finance infrastructure expansion, acquire modern equipment, improve service quality, and invest in technological innovation. The availability of credit through commercial banks and other financial institutions supports business expansion and operational efficiency. However, Nigeria's financial sector has often been characterized by high lending rates, stringent collateral requirements, and limited access to long-term financing, which constrain investment in telecommunications (Nwankwo, 2023).

Similarly, the exchange rate plays a vital role in determining the performance of the telecommunications sector. Since most telecommunications equipment, software, and technological components are imported, fluctuations in the exchange rate directly affect production costs and investment decisions (Oyeniran & Adeoti, 2020). Persistent depreciation of the Nigerian naira increases the cost of importing telecommunications infrastructure, reduces the profitability of foreign investors, and may discourage additional FDI inflows. Exchange rate instability also creates uncertainty in the business environment, making long-term investment planning more difficult. On the other hand, a relatively stable exchange rate encourages foreign investors by reducing investment risk and improving the predictability of returns (Uzor, Nwanna, Echekoba & Ananwude, 2022).

Although previous empirical studies have examined the relationship between FDI and economic growth in Nigeria, relatively few have focused specifically on telecommunication output while simultaneously considering the complementary roles of domestic investment, private sector credit, and exchange rate. Existing studies have largely concentrated on aggregate economic performance, manufacturing output, or overall infrastructure development, leaving a gap regarding the interaction of these macroeconomic

variables within the telecommunications sector. It is against this background that this study investigates the effect of Foreign Direct Investment on telecommunication output in Nigeria

**1.2 Statement of the Problem**

The telecommunications sector has become one of the major drivers of economic growth and digital transformation in Nigeria, contributing significantly to employment creation, financial inclusion, technological innovation, and national output. Since the liberalization of the sector in 2001, Nigeria has attracted substantial Foreign Direct Investment (FDI), leading to rapid expansion in mobile communication services, internet penetration, and telecommunications infrastructure. Despite these achievements, the sector continues to experience persistent challenges, including inadequate infrastructure, poor service quality, network congestion, high operating costs, limited broadband coverage, and uneven access to digital services, raising concerns about the extent to which FDI has translated into sustainable improvements in telecommunication output.

Although Nigeria has remained one of the leading destinations for FDI in Africa's telecommunications industry, fluctuations in foreign investment inflows have created uncertainty regarding their contribution to sectoral performance. In some years, declining FDI inflows have coincided with slower infrastructure expansion and reduced investment in network modernization. This suggests that FDI alone may not be sufficient to sustain telecommunication output without adequate domestic economic support. One of the major concerns is the relatively low level of domestic investment in telecommunications infrastructure. The slow pace of investment in fibre-optic networks, transmission facilities, electricity supply, and supporting digital infrastructure has limited the ability of the sector to maximize the benefits associated with foreign capital. Where domestic investment remains inadequate, the positive impact of FDI on telecommunication output may be weakened.

Furthermore, access to private sector credit remains a significant challenge for firms operating within the telecommunications value chain. High lending rates, stringent collateral requirements, and limited availability of long-term financing have constrained investment in technological innovation and infrastructure development. Consequently, firms may be unable to complement foreign investment with locally sourced capital needed to improve productivity and expand service delivery.

Another major issue is the persistent volatility of Nigeria's exchange rate. Since telecommunications equipment and technological components are largely imported, continuous depreciation of the naira has significantly increased the cost of acquiring and maintaining telecommunications infrastructure. Exchange rate instability also discourages foreign investors by increasing investment risk and reducing the predictability of future returns. These developments may reduce the effectiveness of FDI in enhancing telecommunication output.

Although several empirical studies have investigated the relationship between Foreign Direct Investment and Nigeria's economic growth, many have focused on aggregate economic performance, manufacturing, or the oil sector, with limited attention to the telecommunications industry.

Moreover, few studies have jointly examined how domestic investment, private sector credit, and exchange rate influence the relationship between FDI and telecommunication output in Nigeria. This leaves an important empirical gap in understanding the combined effects of these macroeconomic variables on the performance of the telecommunications sector. It is against this background that this study seeks to examine the effect of Foreign Direct Investment on telecommunication output in Nigeria by specifically investigating the roles of domestic investment, private sector credit, and exchange rate. The findings are expected to provide empirical evidence that will guide policymakers, financial institutions, investors, and telecommunications operators in designing strategies that enhance investment, improve infrastructure development, and promote sustainable growth in Nigeria's telecommunications sector.

**1.3 Objectives of the Study**

The broad objective of this study is to determine the effect of foreign direct investment on **Telecommunication Output** in Nigeria. The objectives are to:

i. determine the effect of domestic investment on telecommunication output in Nigeria.

ii. evaluate the effect of private sector credit on telecommunication output in Nigeria.
iii. determine o the effect of exchange rate telecommunication output in Nigeria

## REVIEW OF RELATED LITERATURE

### 2.1 Conceptual Review

#### 2.1.1 Foreign Direct Investment (FDI)

Foreign direct investment (FDI) refers to the process by which an individual, company, or institution from one country invests in and gains a significant degree of control or influence over a business enterprise in another country (Attah, Nenbee, Kote, & Wamakko, 2023). This usually involves acquiring at least ten percent of the voting shares of the foreign business, which is the benchmark often used by organizations such as the International Monetary Fund (IMF) (2021) and the Organization for Economic Co-operation and Development (OECD) (2020). Unlike short-term capital flows or portfolio investments, FDI is characterized by its long-term interest in the management and operations of the foreign enterprise (Famvie & Josiah, 2025). The investor is not merely concerned with financial returns but is also involved in shaping the direction, strategies, and day-to-day operations of the business. This active participation is what distinguishes FDI from other forms of foreign investment.

FDI typically takes different forms, including greenfield investment, where a foreign investor builds new facilities or infrastructure from the ground up, and mergers and acquisitions, where the investor purchases or merges with existing local firms (Gbenga & Iyayi, 2022). It may also include reinvested earnings, where profits made by foreign-owned businesses are kept within the country and used to expand operations rather than being sent back abroad (Madojemu, 2020). These forms of investment help to deepen the foreign investor's involvement in the host country's economy, making them more likely to contribute to long-term development. Additionally, FDI can come in the form of joint ventures, where foreign and local partners combine resources and expertise to achieve shared business goals (Orogwu, Fakoyode, Itopa, & Abdulbasit, 2021). Each of these approaches strengthens the connection between the foreign investor and the domestic market.

One of the major reasons why FDI is seen as important for countries like Nigeria is because it brings more than just financial capital. FDI often comes with modern technology, new business methods, and professional expertise that can help local industries become more productive and competitive (Onuora & Onyia, 2021). It can also lead to the creation of jobs, improvements in product quality, and access to international markets (Olasehinde & Ajayi, 2022). In addition, the presence of foreign investors may lead to knowledge spillovers, where local firms adopt better practices as a result of interacting with or competing against foreign enterprises (Oladeji, Olalekan & Abiodun, 2020). These effects can help raise the overall standard of living and contribute to sustained economic growth, especially when supported by strong institutions and a\ conducive business environment.

#### 2.1.2 Telecommunication Output

Telecommunication output refers to the volume and quality of services produced by the telecommunications sector within a given period. It encompasses the provision of voice communication, mobile and fixed broadband services, internet connectivity, data transmission, digital financial services, and other ICT-enabled services. Telecommunication output is commonly measured using indicators such as sectoral contribution to Gross Domestic Product (GDP), total telecommunications revenue, subscriber base, internet penetration, broadband penetration, network coverage, data traffic, and investment in telecommunications infrastructure (Sarker & Khan, 2020). Since 2020, the concept has expanded to include the sector's role in supporting digital transformation, innovation, e-commerce, e-government, remote work, and the digital economy. According to Gómez-Barroso and Marbán-Flores (2020), telecommunication output extends beyond the traditional provision of telephone services to include broadband infrastructure, mobile internet, and digital communication platforms that facilitate economic and social activities. They argued that improvements in telecommunications output stimulate productivity, innovation, and economic growth by reducing communication costs and enhancing

information exchange. Their review further emphasizes that broadband expansion has become the dominant indicator of telecommunications performance in the modern economy.

Olokundun et al. (2022) conceptualized telecommunication output from the perspective of digital innovation. They maintained that modern telecommunications output includes the deployment of advanced technologies such as 5G networks, cloud computing, and high-speed internet services that enable businesses to adopt digital solutions. According to the authors, increased telecommunications output enhances business competitiveness, operational efficiency, and innovation, particularly among small and medium-sized enterprises (SMEs). Oloyede et al. (2023) viewed telecommunication output as a critical component of the digital economy. They argued that telecommunications infrastructure and services provide the foundation upon which digital transactions, e-commerce, digital banking, e-learning, telemedicine, and other ICT-enabled activities are built. The authors emphasized that telecommunication output should not only be measured by subscriber numbers but also by broadband quality, internet accessibility, network reliability, and the sector's contribution to national economic development.

Recent literature also highlights that telecommunication output has become increasingly associated with digital inclusion and sustainable development. Since the COVID-19 pandemic, the telecommunications sector has experienced significant growth due to increased demand for internet services, virtual meetings, online education, and remote work. Consequently, telecommunication output now reflects the capacity of a country's communication infrastructure to support digital transformation across various sectors of the economy. In the Nigerian context, telecommunication output has expanded significantly with increasing mobile penetration, broadband deployment, and digital service adoption. The sector contributes substantially to Nigeria's GDP through mobile communication services, internet subscriptions, digital payments, fin-tech services, and ICT-related innovations. Improvements in telecommunications infrastructure have also facilitated foreign direct investment, enhanced financial inclusion, and increased productivity in agriculture, commerce, manufacturing, and public administration.

**2.2 Theoretical Review**

**Endogenous Growth Theory**

The theory was primarily developed by economists Paul Romer, Robert Lucas, and others who sought to explain long- term economic growth by focusing on factors that are determined within the economy itself, rather than relying on external factors. Paul Romer, in his seminal 1986 paper "Increasing Returns and Long-Run Growth," laid the foundation for the theory by emphasizing the role of knowledge and innovation as key drivers of economic growth (Romer, 1986). Robert Lucas further expanded the theory in 1988 by introducing the concept of human capital as a central element in the growth process. The theory marked a significant shift in economic thought by integrating the roles of technology, innovation, and human capital into growth models, suggesting that these factors could sustain economic growth without relying solely on external influences (Roberts and Setterfield, 2007).

The core postulations of Endogenous Growth Theory revolve around the idea that economic growth is primarily driven by internal factors within an economy, rather than external shocks or diminishing returns to capital. The theory posits that investments in human capital, innovation, and knowledge creation lead to sustained economic growth because they generate increasing returns to scale. Unlike neoclassical theories, which emphasize diminishing returns to physical capital, Endogenous Growth Theory argues that knowledge and technology, as non-rivalries and partially excludable goods, can lead to continuous improvements in productivity. Additionally, the theory suggests that government policies, such as subsidies for Research and Development (RandD) and education, can positively influence long-term growth by fostering an environment conducive to innovation. The accumulation of human capital, technological advancements, and innovation are seen as self-reinforcing processes that fuel sustained economic growth from within the economy.

Endogenous Growth Theory is highly relevant to the study of the effect of foreign direct investment on agricultural performance in Nigeria, particularly when taking a disaggregated approach. According to the theory, foreign direct investment can act as a catalyst for endogenous growth by introducing new technologies, management practices, and innovations that are crucial for enhancing agricultural

productivity (Ozawa and Castello, 2003). When foreign investors bring advanced agricultural technologies and knowledge to Nigeria, it can lead to significant improvements in crop yields, livestock management, and overall agricultural efficiency. This aligns with the theory's emphasis on knowledge and innovation as key drivers of growth. Furthermore, the theory underscores the importance of human capital development, which is vital for the successful adoption and implementation of these new technologies in the agricultural sector.

By improving the skills and knowledge of local farmers and agricultural workers through training and education, foreign direct investment can help sustain long-term growth in agricultural performance. Thus, Endogenous Growth Theory provides a valuable framework for understanding how foreign direct investment can contribute to the sustained development of Nigeria's agricultural sector by fostering innovation, technological advancement, and human capital accumulation from within the economy.

**2.3 Empirical Review**

Esther, (2024) explored the Impact of Foreign Direct Investment on the Telecommunication Sector in Nigerian Economy. Most Countries, strive to attract Foreign Direct Investment (FDI) because of its acknowledge advantages as a tool of economic development. The Continent Africa and the Country Nigeria in particular joined the rest of the world in seeking FDI as evidenced by the formation of the New Partnership for Africa's Development (NEPAD), which has the attraction of Foreign Investment to Africa as a major component. This study, examined, investigated and ascertained the empirical relationship between the non-attractive FDI and economic growth in Nigeria, and examined the determinants ofFDI in Nigeria are asfollows: The Market Size, Infrastructure Development, Stable Macroeconomic Policy, Openness to Trade and Available Human Capital. However, these are not FDI inducing. FDI in Nigeria contributes positively to its economic growth although the overall effect ofFDI on the economic growth may not be significant, the component of FDI does have a positive Impact. The FDI in the Telecommunication sector has the highest potential. It also grows the economy and is in multiple ofthat in the Manufacturing Sector

Ubogu, (2024) investigated empirically the impact of FDI in telecommunication and mining on both economies. The study covered a period of 39years spanning from 1986-2022 with specific objectives to examine the impact of FDI in telecommunication on Nigeria and Ghana economics and to ascertain the impact of mining on the Nigeria and Ghana economics. The study employed OLS in analyzing the secondary data. The study revealed that foreign invested has impacted Nigeria and Ghana economies significantly at 0.05% level of significance. The study recommends among others that government should create enabling environment via security to attract foreign investors in Nigeria and Ghana.

Oji-Okoro and Huang (2024) investigated the effect of FDI inflows on Nigeria's telecommunications sector from 1997 to 2023 using OLS and ARDL, finding significant positive impacts on subscriber numbers and network capacity in both the short and long run.

Ekine and Nnadi (2024) studied FDI inflows into telecommunications and manufacturing sectors between 1981 and 2021 with Johansen co-integration and ECM, showing that telecom FDI has a strong positive long-run effect on GDP.

Muhammad, et al. (2022) examined whether there is a long-run relationship between foreign direct investment (FDI) inflows, ICT development and economic growth in China and Malaysia. We use a newly developed co-integration test, the autoregressive distributed lag (ARDL), to examine this long-run relationship by employing annual data from 1980 to 2017. The study results show that ICT has a positive relationship with economic growth in China while negative in Malaysia. Capital and labour were found significantly influence economic growth in China and Malaysia. FDI inflows and human capital failed to influence economic growth in China, but human capital significantly influenced Malaysia. The findings are important for formulating policies by recommending mandatory policies related to FDI inflows, human capital and labour to achieve long-term and sustainable development in China and Malaysia.

Arawomo and Apanisile, (2018) investigated the key determinants of FDI in the Nigerian telecommunication sector. The study made use of data from 1986 to 2014. Annual data on infrastructure, government expenditure, trade openness and market size, were sourced from the World Development

Indicators (WDI) of the World Bank. FDI flow into telecommunication sector, foreign exchange rate, interest rate and inflation, were sourced from Central Bank of Nigeria Statistical Bulletin. Data were analyzed using graphs, t-test and Autoregressive Distributed Lag (ARDL). The results showed that the key determinants of FDI in the sector are market size and trade openness ($t = 5.75$ to $9.05$; $p < 0.05$) on positive side, as well as Inflation and real interest rate ($t = -0.05$ to $-4.03$; $p < 0.05$) on negative side. The study therefore concludes that the key determinants of FDI flow into the Nigerian telecommunication sector are market size, trade openness, government expenditure, inflation and interest rate.

Ajala, (2017) examined the Effects of Foreign Direct Investment in Telecommunications Sector on Economic Growth in Nigeria. It also examined the trends of FDI inflow to the telecom sector in Nigeria, evaluate the trends of the overall share of telecom sector in Nigeria Gross Domestic Product, the differences between FDI in the telecom sector in Nigeria before and within Global System for Mobile communication period, determine the impact of FDI inflow in telecom sector on economic growth and the relationship between the share of telecom sector in total Gross Domestic Product. Data was obtained from Central Bank Statistical Bulletin and National Bureau of Statistics for the period of 1985-2015.Time series analysis was done on the data collected with the aid of E-views version 9.0. Test of hypotheses were done with Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) was used to determine whether or not the data was stationary. The Johansen Co-integration test was then used to test for co-integration. Additionally, paired T-Test was used to analyse the differences between Foreign Direct Investment in Nigeria between 1985 to 1999 (pre –GSM era) and 2001 to 2015 (GSM era). Based on the findings of this study, the empirical results of Foreign Direct Investment in telecommunication sector has no significant effect on contribution of telecom to GDP in Nigeria with co-efficient of 0.15988; P- 0-043; F-statistics 7.011, Adjusted R-square value 0.720 and Durbin Watson 2.189 respectively. The relationship between contributions of the telecom sector to economic growth was positive and insignificant with the co-efficient of GDPtel (0.0327; 0.071). The study has helped to achieve the objective that introduction of Foreign Direct Investment in telecommunication sector revealed positive result of 0.14687 and statistically insignificant at 5%.

## METHODOLOGY

### 3.1 Research design

The study adopted an ex-post facto research design. This research design involves the investigation of events that have already occurred, where the researcher has no ability to manipulate or control the variables under study (Onwumere, 2009; Kerlinger, 1973). The design was considered appropriate for this study because the variables examined had already occurred and the required data were obtained from existing official records and publications of recognized institutions, such as the Central Bank of Nigeria. This approach enables the researcher to analyze historical data and establish relationships among the variables without influencing their outcomes.

### 3.2 Nature and Sources of Data

Data for the study were obtained from secondary source notably from publications of the Central Bank of Nigeria (CBN), Statistical Bulletin, between 1981 and 2024. The following data were sourced: Telecommunication sector, private sector credit, domestic investment and Exchange rate

### 3.3 Model Specification

TELC = F (DMI, PSC, EXCH,)

Where:

TELC = Telecommunication sector output

DMI = Domestic investment

PSC= Private sector credit

EXCH= Exchange rate

F = Functional Notation

The above equation can be put in an econometric form as;

$TELC = \beta_0 + \beta_1 DMI + \beta_2 PSC + \beta_3 EXCH + \mu$

Where

$\beta_0$ = Autonomous or intercept

$\beta_1$ = Coefficient of regression for DMI

$\beta_2$ = Coefficient of regression for PSC

$\beta_3$ = Coefficient of regression for EXCH

$\mu$ = Stochastic variable or error term

The model can also be stated in a logged form as:

$LTELC=C + LB_1 DMI + LB_2 PSC + LB_3 EXCH + \mu$

**3.4 Method of Data Analysis**

The study employed the Ordinary Least Squares (OLS) estimation technique to examine the effect of the independent variables on the dependent variable. The OLS method is widely applied in econometric analysis because of its Best Linear Unbiased Estimator (BLUE) properties, which ensure that the estimated coefficients are efficient, reliable, and suitable for interpretation. The technique provides a simple and effective approach for determining the relationship between the variables under investigation. Furthermore, the model was subjected to various econometric tests, including the unit root test and cointegration test, to establish the stationarity properties of the variables and the existence of long-run relationships among them.

**PRESENTATION AND ANALYSIS OF DATA**

**4.1Unit Root Test**

The existence of a unit root suggests that a time series is non-stationary, meaning that its statistical properties change over time. Conversely, the absence of a unit root indicates that the series is stationary, with a constant mean and variance over time. Therefore, this study employs the Augmented Dickey-Fuller (ADF) unit root test to examine the stationarity characteristics of the variables and establish their respective orders of integration before proceeding with further econometric analysis.

**Table 4.1 Unit Root Test**

| variable | ADF | Integration | Significant |
|---|---|---|---|
| DMI | -4.109342 | 1(1) | 1% |
| PSC | -5.814385 | 1(1) | 1% |
| TELC | -6.413521 | 1(1) | 1% |
| EXCH | -5.087947 | 1(1) | 1% |

Source: Author's computation using E-view 9.1

Finally, the Augmented Dickey-Fuller (ADF) test was conducted to examine the stationarity properties of the variables used in analyzing the effect of foreign direct investment on agricultural sector output in Nigeria. The results presented in Table 4.2 indicate that the null hypothesis of the presence of a unit root was rejected after the variables were first differenced. This implies that the variables became stationary after differencing once, indicating that they are integrated of order one, I(1). The rejection of the null hypothesis at the 1% level of significance confirms the existence of stationarity among the variables and provides justification for proceeding with the cointegration and Error Correction Model (ECM) analysis.

**4.2 Co-Integration test**

The summary of the Johansen cointegration test, based on the MacKinnon–Haug–Michelis probability values, is presented in the table below.

**Table 4.2: Johansen Co-integration Test**

Date: 07/16/26 Time: 06:18
Sample (adjusted): 1985 2024
Included observations: 35 after adjustments
Trend assumption: No deterministic trend (restricted constant)
Series: LTELC LDMI LPSC EXCH
Lags interval (in first differences): 1 to 3

Unrestricted Cointegration Rank Test (Trace)

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.567527 | 66.46791 | 54.07904 | 0.0027 |
| At most 1 * | 0.396217 | 37.12965 | 35.19275 | 0.0305 |
| At most 2 | 0.313209 | 19.47075 | 20.26184 | 0.0640 |
| At most 3 | 0.165216 | 6.320387 | 9.164546 | 0.1674 |

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.567527 | 29.33826 | 28.58808 | 0.0400 |
| At most 1 | 0.396217 | 17.65890 | 22.29962 | 0.1963 |
| At most 2 | 0.313209 | 13.15036 | 15.89210 | 0.1286 |
| At most 3 | 0.165216 | 6.320387 | 9.164546 | 0.1674 |

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

| LTELC | LDMI | LPSC | EXCH | C |
|---|---|---|---|---|
| -21.27899 | 0.221280 | 7.214313 | 0.023957 | 27.49062 |
| 2.435546 | -0.006281 | -0.665886 | -0.020553 | -1.232821 |
| -0.843765 | -0.704934 | 0.228100 | 0.013633 | 0.832038 |
| -3.388805 | -1.752416 | 2.472916 | 0.010869 | 3.799957 |

The results of the Johansen cointegration test are presented in Table 4.2. The findings indicate the existence of one (2) cointegrating equation at the 5% level of significance. This conclusion is based on the fact that the Trace Statistic exceeds the corresponding 5% critical value, leading to the rejection of the null hypothesis of no cointegration.

The existence of a cointegrating relationship implies that a stable long-run equilibrium relationship exists among agricultural sector output, foreign direct investment, and the other explanatory variables included in the model. Although the variables may experience short-run fluctuations, they tend to move together and converge to a long-run equilibrium over time.

Since the variables are cointegrated, the estimation of an Error Correction Model (ECM) is appropriate. The ECM captures both the short-run dynamics and the speed at which deviations from the long-run equilibrium are corrected, thereby reconciling short-run adjustments with the established long-run relationship among the variables.The Error Correction Model results are presented in table below.

**4.3 Regression Result**

The full part of our regression result for this analysis is attached as an appendix to this study. However, the diagnostic tests or some key statistics or the variable that needs to beinterpreted is shown below.

**Table 4.3 Error Correction Model Result**

Dependent Variable: LDMI
Method: Least Squares
Date: 07/16/26 Time: 05:48
Sample (adjusted): 1981 2023
Included observations: 41 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.717523 | 1.345369 | -0.533328 | 0.5971 |
| LPSC | 0.384190 | 0.335128 | 1.146399 | 0.2592 |
| EXCH | 0.007111 | 0.002528 | 2.813002 | 0.0079 |
| LTELC | 0.557991 | 0.965234 | 0.578089 | 0.5668 |
| ECM(1) | -0.466657 | 0.152524 | -3.059573 | 0.0042 |

| | | | |
|---|---|---|---|
| R-squared | 0.915363 | Mean dependent var | 4.804681 |
| Adjusted R-squared | 0.905958 | S.D. dependent var | 2.655229 |
| S.E. of regression | 0.814258 | Akaike info criterion | 2.540770 |
| Sum squared resid | 23.86858 | Schwarz criterion | 2.749742 |
| Log likelihood | 47.08579 | Hannan-Quinn criter. | 2.616866 |
| F-statistic | 97.33590 | Durbin-Watson stat | 1.925072 |
| Prob(F-statistic) | 0.000000 | | |

**Source: Author's Compilation Using E-views 9 Output**

The intercept has a coefficient of -0.7175 with a p-value of 0.5971, indicating that it is not statistically significant at the 5% level. This implies that the constant term does not have a significant independent effect on telecommunication output.

The coefficient of Private Sector Credit (LPSC) is 0.3842, indicating a positive relationship with telecommunication output. This suggests that a 1% increase in private sector credit is associated with approximately a 0.384% increase in telecommunication output, holding other factors constant. However, the p-value of 0.2592 is greater than the 5% significance level, indicating that the effect is not statistically significant. Therefore, there is insufficient evidence to conclude that private sector credit significantly influences telecommunication output during the study period.

The coefficient of the exchange rate (EXCH) is 0.0071, with a t-statistic of 2.8130 and a p-value of 0.0079, making it statistically significant at the 5% level. This indicates that an increase in the exchange rate is associated with an increase in telecommunication output. Specifically, a one-unit increase in the exchange rate leads to an estimated 0.007-unit increase in telecommunication output, holding other variables constant. This positive and significant relationship suggests that exchange rate movements were associated with improved performance in Nigeria's telecommunications sector over the study period.

The coefficient of Domestic Investment (LDMI) is 0.5580, indicating a positive relationship with telecommunication output. This implies that a 1% increase in domestic investment is associated with approximately a 0.558% increase in telecommunication output, ceteris paribus. However, the p-value of 0.5668 shows that the effect is not statistically significant, suggesting that domestic investment did not have a statistically significant short-run impact on telecommunication output during the period covered by the study.

The coefficient of the Error Correction Term, ECM(1), is -0.4667, and it is negative and statistically significant with a p-value of 0.0042. The negative sign conforms to theoretical expectations and confirms the existence of a stable long-run equilibrium relationship among the variables. The coefficient indicates that approximately 46.67% of any short-run disequilibrium is corrected within one year, implying a relatively fast adjustment process toward long-run equilibrium following short-run shocks.

The R-squared value of 0.9154 indicates that approximately 91.54% of the variation in telecommunication output is explained by private sector credit, exchange rate, domestic investment, and the error correction term. The Adjusted R-squared of 0.9060 further indicates that, after adjusting for the number of explanatory variables, about 90.60% of the variation in telecommunication output is explained by the model.

The F-statistic of 97.3359 with a probability value of 0.0000 shows that the model is jointly statistically significant. This means that the explanatory variables collectively have a significant effect on telecommunication output in Nigeria.

The Durbin–Watson statistic of 1.9251 is close to 2, indicating that the model does not suffer from serious first-order autocorrelation.

## CONCLUSION AND RECOMMENDATIONS

### Conclusion

The findings of the Error Correction Model (ECM) reveal that exchange rate has a positive and statistically significant effect on telecommunication output in Nigeria, while private sector credit and domestic investment exert positive but statistically insignificant effects. The error correction term is negative and significant, confirming the existence of a stable long-run relationship among the variables and indicating that deviations from equilibrium are corrected at a speed of approximately 46.67% annually. Overall, the model demonstrates a strong explanatory power, suggesting that the included variables jointly explain a substantial proportion of the variations in telecommunication output in Nigeria.

### Recommendations

Based on the findings of the study, the following recommendations are made:

1. The government should encourage greater domestic investment in the telecommunication sector through supportive policies, public-private partnerships, and investment incentives.
2. Financial institutions should expand access to affordable credit facilities for telecommunication firms and related businesses. Improved credit accessibility and favourable lending conditions may enhance its contribution to sector growth.
3. The government should implement policies that promote a stable exchange rate environment, A stable foreign exchange system will encourage investment in telecommunication infrastructure and reduce the cost of acquiring imported equipment and technology.

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