Foreign Direct Investment and Nigeria's Non-Oil Sector Trajectories in the Post Covid-19 Era: A Simulation Approach

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Abstract

The outbreak of COVID-19 pandemic has devastating consequences on the global economies with Nigeria inclusive. This has affected inflow of foreign capital across national frontiers and consequently the performance of macroeconomic variables in Nigeria. As a remedy to the devastating consequences that the COVID-19 pandemic has presented, the Nigeria government has lunched the Economic Sustainability Plan (ESP) to galvanize external investment sources such as Foreign Direct Investment (FDI) as one of the major response packages. This study therefore, examines the post COVID-19 impact of FDI inflow on non-oil sector trajectories in Nigeria. The study adopts the macroeconomic approach to foreign direct investment and the endogenous growth theory within a framework of a small macro-econometric model. A dynamic stochastic simulation was performed in determining the behavior of non-oil trajectories such as the agricultural output, manufacturing output and service output for both the within and out-of-sample time horizon. it was found that 0.1 per cent increase in foreign direct investment in the post-COVID-19 era would bring about increase in non-oil trajectories such as agriculture, manufacturing and services outputs thereby leading to exports expansion, and boost in private consumption and investment clime in the economy. The study recommends provision of critical infrastructure that could lead FDI absorption, effective exchange rate management and provision of security of lives and property that would attract more foreign investors in Nigeria.

Keywords: Foreign direct investment, Non-oil sector, Trajectories, Simulation

1.   Introduction

Foreign direct investment (FDI) has emerged as the most important source of external resource flows to developing countries over the 1990s, thus it has been very influential instrument in economic development for both developed and developing countries like Nigeria by enabling these countries

to build up physical capital, create employment opportunities, develop productive capacity, exports and increased pace of transfer of and help integrate the domestic economy with the global economy. Nigeria FDI registered a growth equal to 0.7 per cent of the country's nominal Gross Domestic Product (GDP) in September 2020, compared with a growth equal to 0.9 per cent in the previous quarter. It reached an all-time of 2.5 per cent in December 2012 and a record low of 0.2 per cent in March 2020 (National Bureau of Statistics [NBS], 2020).The decline in the inflow of FDI in Nigeria in the first quarter of 2020 was as a result of the COVID-19 pandemic which has hit the global economy.

The COVID-19 pandemic has impacted on the Nigerian economy negatively with the economy contracting by 6.1 per cent year on year in the second quarter of 2020, as a result of lockdown measures that were taken to control the spread of the pandemic (NBS, 2020). This measure depressed economic activities across the sectors of the Nigerian economy. The oil sector contracted by 6.6 per cent year-on-year and 10.1 per cent quarter-on-quarter. The non-oil sector, namely agriculture, Information Communication Technology (ICT), financial services and insurance sectors recorded positive growth of 1.6, 15.1 and 18.5 per cents year-on-year respectively in the second quarter of 2020 (NBS, 2020). However, other key non-oil sector trajectories such as the manufacturing, trade and construction slumped into near record contractions in the second quarter of 2020. Manufacturing sector contracted by 8.8 per cent year on year, trade and construction contracted by 16.6 and 31.8 year on year respectively. All these contractions were driven by supply chain disruption, and collapse in purchasing power as a result of job losses and pay cuts (NBS, 2020).

In response to the challenges posed by the COVID-19 pandemic on the Nigeria economy and the non-oil sector in particular, the government launched a NGN 2.3 trillion Economic Sustainability Plan in June 2020 in a bid to provide some stimulus and salvage the economic damage of the pandemic. The ESP is aimed at providing stimulus packages to the Nigerian economy with a view of preventing economic recession while ensuring jobs sustainability using the non-oil sector (agriculture, manufacturing and services) and infrastructural development. Also, to keep the economy active through carefully calibrated regulatory interventions designed to boost domestic value-addition, de-risk the enterprise environment, galvanize external investments such as FDI and sources of funding (Economic Sustainability Committee, 2020).

The Nigeria Economic Sustainability Plan has identified foreign capital inflow as a stimulus to economic growth and foreign direct investment in particular is one of the external investment channels that can be used as a

strategy for economic recovery. Foreign direct investment brings about technological spillovers, with greater contribution to the economic performance than would have domestic investments. Nigeria has attracted a total FDI of US$2.6 billion in 2020 which is less than that of US$3.3 billion recorded in 2019. This shows a 48.5 per cent decrease compared to the previous years (US$6.4 billion in 2018) under the effect of austerity measures. Though, there has been an upsurge in FDI inflows to Nigeria beginning from the third quarter of 2020 which was US$414.79 million as compared with US$206.58 million of the same third quarter of 2019 (NBS, 2020).

However, the macro weaknesses in non-oil trajectories such as manufacturing, agriculture, services trade and construction have remained elevated. The question that would arise is that, can increase in foreign direct investment present an opportunity to the Nigeria non-oil sector in the post-COVID-19 era? Answering the question requires simulating the effect of increase in foreign direct investment inflow on Nigeria's non-oil sector trajectories. Therefore, the objective of this paper is to simulate the impact of increase in foreign direct investment on the Nigeria's non-oil sector trajectories in the post-COVID-19 era using a macro-econometric model framework. This study is unique from previous studies in that, it focuses on increasing FDI into the non-oil sector in particular as a strategy of the ESP which is aimed at stimulating the aggregate demand and ensuring jobs sustainability in the agriculture, manufacturing, services and infrastructural development in the post-COVID-19 Nigeria.

The reminder of the paper is structured as follows. Section 2 is on literature review, section 3 deals with the methodology of the study, Section 4 presents the results and discussion, and Section 5 is on conclusion and policy recommendations.

2. Literature Review
2.1 Conceptual Clarifications
2.1.1 Foreign Direct Investment (FDI)

Mwilima (2003) described FDI as investment made to acquire a lasting management interest (usually at least 10% of voting stock) and acquiring at least 10% of equity share in an enterprise operating in a country other than the home country of the investor. Kpoghul, Okpe and Anjande (2020) defined FDI as a whole package of resources such as physical capital, modern technology and production techniques, managerial and market knowledge transferred from the owner's economy to another economy for the purpose of business. These utilities tend to spillover to domestic enterprises in the host economy. Foreign direct investment is the distinctive feature of multinational enterprise. It is not simply an international transfer of capital

but rather the extension of enterprise from its home country. This extension of enterprise involves flows of capital, technology and entrepreneurial skills to the host economy where they are combined with local factors in the production of goods for the local and export market

2.1.2   Non-oil Sector Trajectories

Non-oil trajectories define the growth path of non-oil aggregates given policy impulses within and outside an economy (Ministry of Budget and National Planning, 2017). These policy impulses could be increase in the inflows of FDI or monetary or fiscal policies aimed at stimulating the non-oil sector. The non-oil trajectories in this study are concerned with the growth path in non-oil sub-sector outputs such as agriculture, manufacturing, construction, trade, financial services, telecommunication services and transportation services given increase in foreign direct investment in Nigeria.

2.2   Theoretical Review

This study is hinged on two theoretical frameworks, namely; the macroeconomic approach of foreign direct investment and the endogenous growth theory.

The macroeconomic approach of foreign direct investment identified with Kojima (1973) states that the flow of foreign direct investment originates from the comparative disadvantages of home countries and the comparative potential advantages of host countries regarding certain industries. Kojima calls it 'the principle of FDI (Foreign Direct Investment) originating in the marginal industry'. The macroeconomic approach of FDI can be distinguished from other approaches in several aspects. First, it integrates international trade and foreign direct investment. Second, due to its foundation from comparative advantages, it has been more flexible and all embracing. While other approaches discuss most issues in absolute terms, the macroeconomic theory of foreign direct investment approaches relevant issues in a comparative fashion between one country and another. While there is usually only one industry within the framework of other theories, the macroeconomic approach embraces at least two commodities or industries, which is typically shown by the international trade model. Third, the industries seeking for foreign direct investment identified by macroeconomic approach are trade-oriented and complement each other rather than hinder international trade.

As these industries are usually marginal industries in home countries, the production of these industries in host countries will lead to the import of new products from host countries. This is directly contrary to other approaches that identify foreign direct investment originating from industries

with oligopolistic advantages that essentially are anti-trade-oriented. Fourth, the notion of marginal industry can be readily substituted with marginal production without any necessary modification and losing its explanatory power. The macroeconomic approach to foreign direct investment tends to explain the function of FDI under different economic environment and focuses on its future trend than to the present form. This theory also tends to perpetuate the dependent relationships that developing countries have on developed countries.

On other hand, the endogenous growth theory hypothesized by Romer in 1986 posits that the growth paths of productivity in an economy is derived by technological innovations based on investment (contribution) in technological development and the stock of human capital. The endogenous growth model overcomes the shortcomings of the neoclassical theory by rejecting the neoclassical premise of diminishing marginal productivity of capital, assume the possibility of production scale effect throughout the economy, and often focus on the impact of external effects on the profitability of investment. The theory identifies economic growth as promoted in the long-run by the introduction of new technological production processes in the host country, and that Foreign Direct Investment is assumed to be more productive than domestic investment. Thus, foreign direct investment enhances economic growth through technological spillovers. These offset the diminishing capital return effect by boosting the present stock of knowledge through labour mobility, training and skills, and through managerial skills and organizational arrangements.

The theoretical expositions of macroeconomic approach to foreign direct investment and the endogenous growth model clearly shows that, with the comparative advantage that Nigeria has in terms of resource endowment, market size among others, the inflow of foreign direct investment with its externalities such as technological transfers, managerial skills, innovations among others, the growth paths of Nigeria's non-oil sector especially agriculture, manufacturing and services would improve significantly in the post-pandemic era.

2.3   Empirical Review

The literature on the impact of foreign direct investment on Nigeria's non-oil sector trajectories is concisely presented in this section. This shows the role of international investments in the non-oil sector in Nigeria.

Edeh, Eze and Ugwuanyi (2020) investigated the impact of FDI on agricultural sector in Nigeria using quarterly time series data for the period 1981 to 2017. The study revealed that FDI has a positive and significant impact on agricultural sector output and therefore, advocated for a short and

medium-term framework that will address increased funding of the agricultural.

In a study by Kpoghul, Okpe and Anjande (2020) on the tripartite relationship between trade openness, foreign direct investment and the performance of the Nigerian economy within a framework of macro econometric model. The study found that increase in inflow of foreign direct investment impact macroeconomic variables such as private investment, consumption, and output of oil and non-oil as well as non-oil exports in Nigeria. Akinwale, Adekunle and Obagunwa (2018) examined the relationship between FDI inflow and agricultural sector productivity in Nigeria. Using the co-integration and error correction models, it was established that FDI inflow as a component of international investment has significant influence on agricultural development in Nigeria.

In a related study, Eze, Nnaji and Nkalu (2019) investigates the impact of FDI on manufacturing sector output growth in Nigeria for the period 1970-2016 using Ordinary Least Squares (OLS) and Granger causality tests. The findings of the study revealed that there is a long-run relationship between FDI and manufacturing sector output growth though statistically insignificant and a unidirectional causality from FDI to manufacturing sector output growth in Nigeria.

Ebekozien, Abdul-Aziz and Jaafar (2018) examined the inflow of FDI in the Nigerian construction sector for two different political regimes from 1984 to 2017. An ex-post facto research design was used to establish the relationship of FDI inflow on construction activities during the two regimes. It found that the democratic era encourages significant inflow of FDI into the construction sector than the military regime. On the services sector and banking sector in particular,

Adigwe et al. (2018) studied the causality relationship between bank sector operations in Nigeria and FDI from 1997 to 2015. The findings indicated significant bidirectional causality relationship between banking operations and FDI, a unidirectional causality relationship between domiciliary operations and FDI. Smart banking practices and cautious focus on tackling monetary policy variables such as monetary policy rate, cash reserve ratio and loan portfolio which are capable of attracting investor were recommended.

Also, Arawomo and Apanisile (2018) in a study on the impact of FDI on the Nigerian telecommunication performance for the period of 1986 to 2014 within the framework of Autoregressive distributed Lag (ARDL). The study established that FDI flow into the telecommunication sector has impacted positively on the performance of the sector.

This study is different from previous studies in that, it forecast the impact of increase in foreign direct investment flow as a strategy of the Economic

Sustainability Plan on non-oil trajectories in the post-pandemic Nigeria within a single framework.

3.   Methodology

This study builds a small macro-econometric model of the Nigerian and is derived from the theoretical foundations of the Keynesian and Mundell-Fleming IS-LM framework. The model has ten behavioral equations and three identities. The Two Stage Least Squares (2SLS) framework is used to estimate the behavioral equations in the model using annual data sourced from Central Bank of Nigeria Statistical Bulletin for the period 1970 to 2018, and National Bureau of Statistical bulletin for the period between 1970 and 2020. The validity of the model is checked through a dynamic-stochastic simulation procedure for within-sample and out-of-sample forecasts spanning between 2019 and 2023. The variables used in the model are presented in appendix I.

3.1   Model Specification
3.1.1   Aggregate Demand Block

Consumption constitutes the largest component of aggregate demand. The aggregate demand block is disaggregated into private consumption and private investment. Following the Keynesian psychological law of consumption and Kuznet's theory of consumption, private consumption is specified as a function income (RGDP), price level (CPI), exchange rate (EXR), foreign direct investment (FDI) and the previous value of consumption (PC_{t-1}). The consumption model, which follows Kpoghul et al. (2020) Aminu and Ogunjimi (2019) models closely, is specified as.

$$PC = \varphi_1 + \varphi_2 RGDP + \varphi_3 CPI + \varphi_4 EXR + \varphi_5 FDI + \varphi_6 PC_{t-1} + \mu_1 ..(1)$$

Aggregate investment is the second component of aggregate demand and it is a veritable instrument for achieving and sustaining economic growth. Following Keynesian and classical investment theories, interest rate (INT) and income (RGDP) drive investment. This study incorporated foreign direct investment (FDI), inflation rate (CPI), and exchange rate (EXR) as explanatory variables. Investment is measured by gross fixed capital formation (GFCF) which includes labor force and physical capital. Thus, the investment model can be specified as follows:

$$INV = \beta_1 + \beta_2 INT + \beta_3 RGDP + \beta_4 FDI + \beta_5 CPI + \beta_6 EXR + \mu_2 ..(2)$$

3.1.2   Production Block

In line with the diversification drive of the Nigeria government from oil to non-oil as a strategy for lifting the economy from economic recession in the post-COVID-19 era, this study only considered and modeled the non-oil sub-sector. Non-oil production comprises of all other sectors besides oil and gas. It is disaggregated into three components namely agricultural, manufacturing, and services value addition. These sub-sectors employ a huge proportion of labor force and attract capital inflow and are critical sectors that have been in the development plan of the government of Nigeria over the years.

Agricultural Output

Agricultural production (YA) in Nigeria is seasonal and depends relatively on the amount of rainfall and government support. Hence, agricultural output in Nigeria is determine by the amount of rainfall (RNF), credit to agricultural sector (CREA), prime lending rate (PLR), government expenditure (GEX), agriculture capacity utilization (CUA), and foreign direct investment (FDI). The equation for agricultural value added is specified in log form as follows.

$$\log YA = \lambda_1 + \lambda_2 \log RNF + \lambda_3 \log CREA + \lambda_4 \log PLR + \lambda_5 \log GEX + \lambda_6 \log CUA + \lambda_7 lofFDI + \mu_3$$

....(3)

Manufacturing Output

Manufacturing output (YM) in Nigeria is modeled in line with (NISER, 2016) and is a function of the index of electricity production (IEP), import of capital goods (MK), foreign direct investment (FDI), credit to manufacturing (CREM), nominal exchange rate (NER), and government expenditure (GEX). Therefore, the equation for manufacturing output is specified as.

$$\log YM = \varphi_1 + \varphi_2 \log IEP + \varphi_3 \log MK + \varphi_4 \log FDI + \varphi_5 \log CREM + \varphi_6 \log NER + \varphi_7 \log GEX + \mu_4$$

....(4)

Services Output

Like other aspects of productive activities, services and output (YS) in Nigeria is determined by credit to the private sector (CPS), exchange rate (EXR), foreign direct investment (FDI), import of capital goods (MK), infrastructure proxy by the index of electricity production (IEP), and government expenditure (GEX). Thus the services output equation is given as.

$$\log YS = \alpha_1 + \alpha_2 \log CPS + \alpha_3 \log EXR + \alpha_4 \log FDI + \alpha_5 \log MK +$$
$$\alpha_6 \log IEP + \alpha_7 \log GEX + \mu_5$$
....(5)

3.1.3   External Block

Nigeria's external trade consists of exports and imports. Exports are sub-divided into oil and non-oil exports, while imports are sub-divided into import of capital goods and imports of consumables. For the purpose of this study, only non-oil export is modeled and import is taken in aggregate.

Non-oil exports

Non-oil exports (XN) in Nigeria are further sub-divided into the export of agriculture (XA), manufacturing export (XM) and services export (XS). In Nigeria, non-oil exports are influenced by exchange rate (EXR), tariffs (TAR), production in the non-oil sector (YN), credit to the private sector (CPS), domestic cost of funds captured by prime lending rate (PLR), terms of trade (TOT) and foreign direct investment (FDI). Follows Aminu and Ogunjimi (2019) the specifications for the various components of non-oil exports as identified above are stated as follows.

$$XA = \beta_1 + \beta_2 EXR + \beta_3 TAR + \beta_4 YA + \beta_5 CPS + \beta_6 TOT + \beta_7 FDI + \mu_6$$
....(6)

$$XM = \sigma_1 + \sigma_2 YM + \sigma_3 CPS + \sigma_4 EXR + \sigma_5 PLR + \sigma_6 TOT + \sigma_7 FDI + \mu_7$$
....(7)

$$XS = \varphi_1 + \varphi_2 EXR + \varphi_3 CPS + \varphi_4 PLR + \varphi_5 TOT + \varphi_6 FDI + \varphi_6 XS + \mu_8$$
....(8)

Imports

In Nigeria, total imports are influenced by total output in the economy represented by gross domestic product (RGDP), exchange rate (EXR), tariff (TAR), access and cost of finance proxy by prime lending rate (PLR), terms of trade (TOT) and foreign reserve (RES). Therefore, the model for imports is specified as.

$$M = \delta_1 + \delta_2 RGDP + \delta_3 EXR + \delta_4 TAR + \delta_5 PLR + \delta_6 TOT + \delta_7 RES + \mu_9$$
....(9)

3.1.4   Real Gross Domestic Product

Following Cobb-Douglas production function, aggregate capital

stock and aggregate labour force are the major drivers of aggregate output in an economy. Also, following the specification of the aggregate output function in the studies by Aminu and Ogunjimi (2019) labor force, human capital measured using expenditure on education and physical capital represented by gross fixed capital formation determines aggregate output (RGDP). Aggregate output is also a function of private investment (INV), exchange rate (EXR), Government expenditure (GEX), foreign direct investment (FDI), and infrastructure proxy by the index of electricity production (IEP). Thus, the aggregate output model can be specified as follows:

$$RGDP = \alpha_1 + \alpha_2 INV + \alpha_3 EXR + \alpha_4 GEX + \alpha_5 FDI + \alpha_6 IEP + \mu_{10}$$
....(10)

Identities

$$YN = YA + YM + YS$$
....(11)

$$NX = XO + XN$$
....(12)

$$RGDP = PC + INV + GEX + X - M$$
....
.(13)

3.2   Policy Scenario

The policy scenario for this study is 10 per cent increase in foreign direct investment flow as a strategy under the Economic Sustainability Plan. As a forward looking policy document, the plan focuses on galvanizing foreign capital and in particular foreign direct investment to stimulate the real sector with emphasis on the non-oil sector. Hence, the model simulation solution is the stochastic-dynamic approach.

4.   Results and Discussions

4.1   Results of the Two Stage Least Square (2SLS) Method

The results of the macro-econometric model are presented in Table 1 and it reveals that, private consumption and private investment have positive relationship with foreign direct investment in Nigeria. This implies that 1 per cent increase in foreign direct investment flow would increase private consumption and private investment by 0.03 and 0.74 per cents respectively in Nigeria. These findings corroborate that of IJirshar et al. (2019) and Adelowokan et al. (2020) who found a positive and significant relationship between foreign direct investment, consumption and investment.

1: Results of the Two Stage Least Square (2SLS) Method

Results of Aggregate Demand Block
PC = 1.16 - 0.12 * RGDP + 0.02 * CPI + 0.01* EXR + 0.03 * FDI + 0.93 * PC(-1)   (0.39) (-0.33)   (0.22)   (0.09)   (0.04)   (5.61) Adjusted R-Square = 0.92   D.W = 2.81
INV = 18.9 - 0.34 * INT - 2.97* RGDP + 0.74 * FDI + 1.89 * CPI - 1.39 * EXR   (3.17) (-0.72)   (-2.49)   (2.74)   (4.46)   (-2.58) Adjusted R-Square = 0.91   D.W = 1.64
Results of Production Block
YA = 18.9 - 3.22 * RNF - 0.18 * CREA + 0.47 * PLR + 0.16 * GEX + 0.65 * CUA - 0.28 * FDI   (3.09) (-2.38)   (-1.02)   (0.86)   (1.78)   (3.46)   (-2.84) Adjusted R-Square = 0.73   D.W = 1.98
YM = 3.92 + 0.01 * IEP + 1.24 * MK - 1.52 * FDI - 0.02 * CREM - 1.66 * NER + 0.66 * GEX   (1.51) (0.01)   (1.22)   (-2.93)   (-0.02)   (-1.47)   (2.03) Adjusted R-Square = 0.52   D.W = 1.65
YS = 4.39 + 0.47 * CPS + 0.58* EXR - 1.34 * FDI + 0.78 * MK - 1.56 * IEP + 0.38 * GEX   (1.45) (0.46)   (0.88)   (-2.33)   (0.63)   (-1.45)   (1.31) Adjusted R-Square = 0.74   D.W = 1.89
Results of External Block
XA = 3.69 + 0.24 * EXR - 0.06 * TAR - 0.29* YA + 0.64 * CPS - 0.23 * TOT + 0.04 * FDI   (2.49) (0.95)   (-0.55)   (-0.95)   (2.88)   (-0.85)   (0.19) Adjusted R-Square = 0.96   D.W = 1.87
XM = - 6.21 - 0.07 * YM - 0.79 * CPS - 0.46* EXR + 3.08 * PLR + 2.57 * TOT + 0.37 * FDI   (-2.29) (-0.19)   (-1.11)   (-0.49)   (1.74)   (3.00)   (0.58) Adjusted R-Square = 0.50   D.W = 1.82
XS = 7.29 + 0.11 * EXR + 1.06 * CPS + 3.18* PLR - 3.51 * TOT + 0.77 * FDI + 0.66 * YS   (1.55) (0.07)   (1.01)   (1.33)   (-2.55)   (1.66)   (0.96) Adjusted R-Square = 0.79   D.W = 1.96
M = - 4.21 + 0.62 * RGDP - 0.33 * EXR - 0.05 * TAR - 0.50 * PLR + 0.32 * TOT + 0.42 * RES   (-2.04) (1.71)   (-0.93)   (-0.42)   (-0.68)   (2.38)   (2.11) Adjusted R-Square = 0.82   D.W = 2.46
Results of Real Gross Domestic Product
RGDP = 3.84 - 0.11 * INV - 0.09 * EXR + 0.05 * GEX + 0.17 * FDI + 0.79 * IEP   (9.85)(-1.42)   (-0.59)   (0.79)   (1.37)   (3.58) Adjusted R-Square = 0.60   D.W = 1.86

Source: Computed from Eviews-9, (2021).

In the production block, foreign direct investment negatively impacted non-oil value added that is, agriculture, manufacturing and services but is statistically significant in explaining the behavior of non-oil sector output. This is in line with Akinwale, Adekunle and Obagunwa (2018) that foreign direct investment has a significant role in non-oil sector and especially agricultural output.

The result of the external sector block shows that foreign direct investment meets the expected sign and is statistically significant in explaining agriculture, manufacturing and services exports in Nigeria. Hence, the positive coefficient on foreign direct investment suggests that 1 per cent increase in foreign direct investment would boost real demand in agriculture, manufacturing and services exports by 0.04, 0.37 and 0.77 per cent respectively. These findings are in tendon with that of Kpoghul (2015) who found that foreign direct investment impacted non-oil export negatively and is statistically significant in explaining non-oil export in Nigeria. Lastly, the result suggests that foreign direct investment has a positive and statistically insignificant relationship with real gross domestic product in Nigeria. The coefficient indicates that 1 per cent increase in foreign direct investment flow would trigger real gross domestic product by 0.17 per cent in Nigeria. This finding is in line with that of Ugwuanyi, Efanga and Ogochukwu (2020) that foreign direct investment impacted positively but statistically insignificant on economic growth in Nigeria.

## 4.2   Model Forecast Evaluation and Simulation

The main aim of this macro-econometric model is to explain the relationships between foreign direct investment and non-oil trajectories, forecast and simulate future time paths of the selected non-oil trajectories in the post-COVID-19 era. The predictive accuracy of the model is crucial because it shows the closeness of the solution values of each equation in the models to the time paths of their actual values. Therefore, this model is evaluated for both within-sample and out-of-sample predictive performance and the results are presented and discussed as follows.

Table 2: Validation Statistics of the Macro -econometric Model

Endogeneous Variables	Mean Absolute Error MAE	Root mean Square Error RMSE	Theil Inequality Coefficient
INV	0.195833	0.218391	0.020541
YA	0.156576	0.197019	0.022115
YM	0.419130	0.589951	0.068130
YS	0.379454	0.565405	0.069290
PC	0.058515	0.070246	0.004780
XA	0.124097	0.174148	0.022938
XM	0.401304	0.552295	0.111003
XS	0.457335	0.574395	0.062499
M	0.118726	0.153721	0.066847
RGDP	0.074073	0.129278	0.011628

Source: Computed from Eviews-9, (2021).

The statistics used to evaluate the predictive performance of a model are Mean Absolute Errors (MAE), Root Mean Square Errors (RMSE) and Theil inequality coefficient. Table 2 presents these statistics for all the endogenous variables and a cursory look at the statistics shows that the errors are considerably small indicating that the model predicts historical paths of the series. Time series data running from 1970 to 2018 is used to generate a static solution for the model. The actual values are plotted against the static simulation values for the endogenous variables
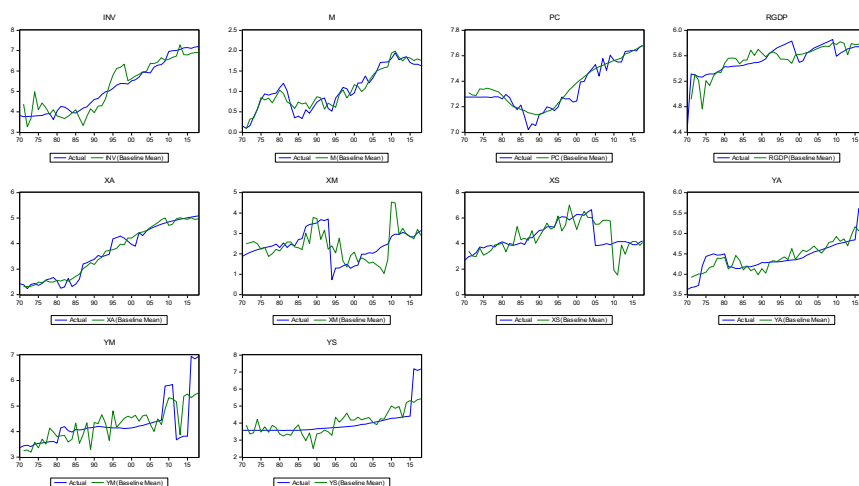
Figure 1: Actual and Simulated Values of the Endogenous Variables
Source: Graphed from Eviews-9, (2021).

The figure reveals that the baseline simulated values of the endogenous variables are very close to actual series and thus, were able to simulate the critical turning points of the historical data. This also validates the good forecasting ability of the model hence, adverting that the projections of the model will be accurate for policy direction in the post-pandemic Nigeria.

4.2.1   Simulation Results

In order to examine the impact of foreign direct investment inflow on non-oil sector trajectories in Nigeria in the post COVID-19 era, one simulation experiment was conducted.

Policy Scenario

The policy scenario used for the simulation was: 10% increase in foreign

direct investment inflow and its effect on non-oil sector trajectories in the post-pandemic era in Nigeria. The results of the simulation are presented in Table 3.

Table 3: Simulated Results for 10% Increase in Foreign Direct Investment Inflow

Endogenous Variable	0.1% Increase in FDI flow Within Sample Forecast	0.1% Increase in FDI Out-of-Sample Forecast
INV	4.22	6.37
YA	3.45	4.03
YM	3.28	4.34
YS	3.01	4.02
PC	6.37	6.61
XA	2.69	4.55
XM	1.42	1.57
XS	3.53	4.09
M	0.05	0.87
RGDP	4.56	4.92

Source: Computed from Eviews-9, (2021).

The result of the simulation experiment indicates that 10 per cent increase in foreign direct investment inflow would boost private investment, agricultural outputs, manufacturing output and services output in Nigeria by 4.22, 3.45, 2.28 and 3.01 per cents respectively from within-sample. When forecasted in the post-COVID-19 era, it reveals that 10 per cent increase in foreign direct investment would trigger private investment, agricultural, manufacturing and services outputs by 6.37, 4.03, 4.34, and 4.02 per cents respectively from the out-of-sample horizon. These findings are in consonance with that of Edeh et al. (2020), Eze et al. (2019) and Adigwe et al. (2018) who established the impact of foreign direct investment on agriculture, manufacturing and services outputs in Nigeria.

Again, the simulation result suggests that 10 per cent increase in foreign direct investment would increase agricultural export, manufacturing export, services export and imports by 2.69, 1.42, 3.53 and 0.05 per cents respectively from the within-sample horizon. Projections into the post-COVID-19 era shows that agriculture, manufacturing and services exports as well as imports would increase by 4.55, 1.57, 4.09 and 0.87 per cents respectively from the out-of-sample horizon. The increase in imports can be attributed to the import of capital, intermediate goods and the import dependent nature of the Nigerian economy. These findings corroborate that of Kpoghul (2015) and Murtala et al. (2016) who found that foreign direct investment flow impact exports in Nigeria. Finally, the simulation experiment

reveals that increase in foreign direct investment by 10 per cent would boost private consumption and gross domestic product by 6.37 and 4.56 per cent respectively from within-sample. A projection into the post-pandemic era indicates that private consumption and real gross domestic product would increase by 6.61 and 4.92 per cent respectively. These findings too are in agreement with Ugwuanyi, Efanga and Ogochukwu (2020) that foreign direct investment impacted positively on economic growth of Nigeria.

5.   Conclusions and Policy Recommendations

This study simulates the impact of increase in foreign direct investment inflow on non-oil sector trajectories in Nigeria in the post-COVID-19 era within the framework of a macro-econometric model. Following the findings, the study concludes that 10 per cent increase in the inflow of foreign direct investment into the Nigerian economy and non-oil sector in particular would boost private investment and other trajectories such as: agricultural, manufacturing and services outputs, as well as their export demand, private consumption and real gross domestic product. Towards this end, this study makes the following policy recommendations:

First, Government should mobilize and ensure the provision of critical infrastructures that will enhance the absorption of foreign direct investment with its externalities. This will result into employment expansion across the fields of agriculture, manufacturing, digital economy, renewable energy, and house construction among others.

Second, there should be effective exchange rate management policies by the Central Bank of Nigeria. The current level of Naira depreciation suggests high cost of production by foreign investors hence; effective exchange rate management will enhance the value of Naira thereby reducing the cost of production in Nigeria and by extension attract foreign investment.

Finally, the government should ensure the provision of security of lives and property in the country so as to boost domestic production in agriculture, manufacturing and services as well as attract the inflows of foreign direct investment in the country.

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Appendix I: Variable Description

Variable	Description	Type	Unit
CPI	Consumer price index	Exogenous	Index
CPS	Credit to the private sector	Exogenous	Million
CREA	Credit to agriculture	Exogenous	Million
CREM	Credit to manufacturing	Exogenous	Million
CUA	Capacity utilization in agriculture	Exogenous	Million
EXR	Exchange Rate	Exogenous	Per cent
FDI	Foreign Direct Investment	Exogenous	Million
GEX	Government Expenditure	Exogenous	Million
IEP	Index of Electricity Production	Exogenous	Index
INT	Interest Rate	Exogenous	Per cent
INV	Investment (Private Investment)	Endogenous	Million
M	Import	Endogenous	Million
MK	Import of Capital Goods	Exogenous	Million
NER	Nominal Exchange Rate	Exogenous	Per cent
NX	Net Export	Identity	Million
PC	Private Consumption	Endogenous	Million
PLR	Prime Lending Rate	Exogenous	Per cent
RES	Reserves	Exogenous	Million
RGDP	Real Gross Domestic Product	Endogenous	Million
RNF	Rainfall	Exogenous	Per cent
TAR	Tariff Rate	Exogenous	Per cent
TOT	Terms of Trade	Exogenous	Per cent
XA	Export of Agriculture	Endogenous	Million
XM	Export of Manufacturing	Endogenous	Million
XS	Export of Services	Endogenous	Million
YA	Agricultural Output	Endogenous	Million
YM	Manufacturing Output	Endogenous	Million
YN	Non-oil Output	Identity	Million
YS	Services Output	Endogenous	Million

Source: CBN Statistical Bulletin Various Issues and National Bureau of Statistics Bulletin