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Trade Liberalization and Nigeria Industrial Response: An Econometric Analysis.

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Abstract

The study empirically investigates the effect of trade liberalization on Nigeria industrial response from 1990 to 2024. It adopted time series methodical approach and obtained data from the Central Bank of Nigeria Statistical Bulletin. The index of Industrial Production was proxy for industrial response as the dependent's variable vis a vis other explanatory variable in the study. The basis of our data sets is the assessment of long and short-term correlations in the variables utilizing Auto Regressive Distributed Lag and Bounds testing for co-integration. Our data indicate that trade openness in Nigeria positively correlates with industry responsiveness within the short term, and has no effect in the long term. Evidence suggests that foreign direct investment enhances industrial responsiveness within the short term however, the long-term consequences are ambiguous. This holds true in several nations, including Nigeria. The study conclude that trade liberalization increases Industrial Response in the short run but does not enhance Industrial Response in the period the study covers. It recommended that, there should be strong industrial policies to support local manufacturers, infrastructure and technology. Import-substitution for key industries and export diversification beyond crude oil should be in focus.

Keywords: *Trade Liberalization, Industrial Response, Trade Openness, Foreign Direct Investment, and Import Penetration Ratio.*
JEL: F11, F13,14

1. Introduction

Trade and Trade policies have evolved over decades and much associated with improved fortunes of trading partners, either as beneficiaries of trading goods and services or in the monetary returns of such activities. The quest for nations to improve the well fare of citizen's necessitated trade, in that, many nations of the world enjoy products and services that they could not produce but made possible through trading partnerships. Adam Smith (1776), in his concept of Invisible Hand describes individual's self-interest and social benefit derivation through free market. He argued that mercantile system engenders protectionist, labor division and minimal government involvement to enhance national revenues. Subsequent to World War II, a coalition of 23 nations—comprising 12 developed nation and The GATT was established by eleven developing nations in 1947, signifying the onset of trade liberalizations. Trade barriers were to be reduced under GATT. The World Trade Organization succeeded it in 1994. The prime focus of trade liberalization is to allow countries market what they produce efficiently, according to Echekoba, Okonkwo, and Adigwe (2015). A confluence of circumstances, such as chronically poor productivity and an economically restricted framework, precipitated trade liberalizations and trade policy, which subsequently resulted in elevated inflation, unemployment, diminished living standards, and substantial external borrowing.

In order to take advantage of Liberalization, Nigeria deliberately embarked on actions which were considered to positively grow its industrial paradigm, namely; Membership of the World Trade Organization in 1995, ECOWAS Trade Liberalization Scheme aimed at removing tariffs and other barriers, Tariff Reforms , Foreign

Exchange Liberalization which was specifically adopted by the Central Bank to make it easier for businesses to acquire foreign currency with ease, Nigerian Investment Promotion Council, and several Trade Agreements including the African Continental Free Trade Area Agreement. Indulgence in these policies and agreements were to maintain stable and consistent macroeconomic stability and grow the Industrial Sector. In addition to Governments specific actions at trade Liberalization which will support industrial performance, it deregulated, privatized and ensured trade openness. Government also encourages export incentives, bilateral / regional and trade preference agreements with different countries perceived to bring about positive industrial response. For instance, between 2011 and 2023, the manufacturing output of the country has consistently been on the increase, rising from 7.1% in 2011 to15.36%. This development brought about an earning in foreign exchange of about 55.74B USD specifically, in 2023 (World Bank).

Trade liberalization appears to be a contentious policy. Eleanya (2021), contend that modern trade theories have predicted that trade openness speeds up economic growth. Proponents of the policy argue that free trade and reduction of trade barriers will assist the economy by way of gaining income from duties, generate employment and enhance international linkages and interconnectivity as well as promote citizens welfare by enjoying products and services emanating from outside the shores of their nation.

Nigeria has already implemented many economic reforms to mitigate the effects of contentious government interventions on the productive sector and to re-establish more stable markets. The objective of trade liberalization is to enhance economic accessibility, enabling countries to exchange knowledge and experiences, increase production, and gain access to a broader array of goods and services, even with the absence of domestic resources for their production. Industrial response tells of the reaction or adjustment of industries to variations or vicissitudes arising from removal of trade barriers. It is expected that when trade policies are made to the extent that free trade are allowed among nations, free flow of goods and services exists, competitions among various producers thrive and free flow of information about products, producers, market prices and buyers, etc. exists too. This phenomenon signals the industrial sector either to expand the scope of production or shrink their output. This reaction depends on the availability of the means of production, factor endowments and general price level vis-a vis consumers perception too. Industrial adjustments also depend on industrial investments, diversification needs, innovation and product mix at its disposal.

The objective of this study is to examine the Nigerian manufacturing sector response to trade liberalization. We will examine many relationships, including those between imports and GDP, net exports and GDP, exchange rates and GDP, and trade openness and GDP.

2. Literature Review

Conceptual Literature

Trade Liberalization

Trade liberalization describes the removal of trade barriers among different trading countries for the purpose of promoting free trade. The process eliminates barriers like trade restrictions, quotas and ensure competitive market. DeRosa (2021), affirm that Trade Liberalization integrates international markets, promotes increased economic activity, productivity and growth. Trade liberalization can also be described as the concept of forging multiplicity of linkages and interconnectedness between States and the societies creating a modern World of global village. Krugman and Obstfeld (2009), contends that Trade Liberalization in developing countries have two consequences, dramatic increase in the size of trade and change in the nature of trade as the share of manufactured goods import surged in the developing countries.

Industrial Response

Industrial response is the action, inaction or reaction of the industrial sector to trade policies. Simply put, it refers to ways industries react to the decrease or removal of trade obstacles and other restrictions related with international trade. Reaction of the industries could result in increased or decreased productivity or output of the industries.

It is expected that when open trading policy is in place, there is the likelihood for export or import to be positively or negatively affected. The response resonates to the level of competitiveness, advance in technology or factor endowments. For instance, in the event of liberalization, it is expected that the door of importation is opened to products from the international market. This may boost or shrink local production depending on the commodities in question. Industrial response could present in the form of specialization, import penetration, innovation and investment, growth in export or restructuring in the industries. Obviously, industrial inputs importation will boost local production and enhance the Gross Domestic Products.

Theoretical Literature Review

The study is anchored on some theories viz; Heckscher-Ohlin Model of Resources and Trade, Specific Factors and Income Distribution Model and Export Led Growth Hypothesis.

Heckscher-Ohlin Model of Resources and Trade:

In 1919, Eli Heckscher introduced this concept, which Bertil Ohlin elaborated on in 1933. The H-O model is the predominant reference. Theorists offered rationales for international trade. The idea posits that a nation will procure items that it can produce using its abundant and cost-effective resources, while importing goods that require its scarce and costly resources for production. The basis of international trade is the benefits derived from the exchange of commodities and services across nations. It is this underlying intrinsic reward that propel a country to export that product with which it has abundant and cheap resources to produce, while at the same time, import that the factors of production will cost him more. Certainly, this very product will cost him more to produce, hence importation of H-O model signifies that factor endowments are crucial in international trade.

Heckcher-Ohlin model is built on some major assumptions namely; that there only two countries and two commodities. Perfect competition exists in dealing with the export or import of any commodity giving the buyer or the seller the latitude of choice unhindered. The model further assumes that there is no Government interference in pricing, supply, etc. of the products.

Trade is an essential element of national specialization, as per the notion. This suggests that nations will acquire products that are challenging to produce with their available resources while concentrating on manufacturing commodities for which they possess sufficient resources. The nexus of this theory with our study is that industry will positively respond to free trade given the abundance of the resources it is endowed with respect to the factor cost.

Specific Factors and Income Distribution Model:

Developed in 1971 by Robert Baldwin and Ronald Jones. Often referred to a three-factor model. It provides a broad explanation of factors responsible for trade such as Labor (L), Capital (K) and a specific factor (S) or specific to a particular industry. The specific factor is usually immobile among industries, meaning that it can only be applicable or use in one industry. However, Labour and capital are mobile and can circulate. The model work on the assumption that an economy produces two commodities applying three distinct factors of production. Thus, industry A produces commodity Y employing labour, capita and a specific factor while industry B produce commodity X employing labour and capital. The significance of this model is that trade policies specifically, quotas and tariffs affect income distribution among factors of production. This can also determine the nature of industrial response to trade liberalization. Furthermore, effect of technology and factor endowments with respect to income distribution can be evaluated. It is therefore apt the choice of this model in this study.

Export - Led Growth Hypothesis:

Hollis Chenery and Lance Taylor developed the Export Led Growth Model in 1960 and later in 1970, elucidate correlation between an economy's performance and its level of exports. Proponents of exports contend that they are necessary for economic growth as they create foreign exchange, encourage investment, and enhance productivity. The export-led approach posits that an economy's overall growth depends on the expansion of its exports rather than solely on its capital and labour resources. Helpman and Krugman (1985) concurred that increased exports result in enhanced productivity, hence supporting the export-led growth hypothesis. In Nigeria, research have shown that export has significantly helped in the growth of the economy. Anyanwu and Ojima (2021), affirmed that non-oil export has supported the foreign reserve of Nigeria thereby, assisted in the growth of the economy. Accordingly, export-oriented industries have enhanced job creation, improved productivity, create access to new markets and boost economic diversification.

The implication and the nexus for this theory in this study is that, export-led growth strategy can produce a veritable avenue for economic development, hence generate a positive industrial response in the growth trajectory of Nigeria and other developing economies.

Empirical Literature

Gan and Gunther (2024) conducted research on how many East Asian nations' economy have been impacted by trade liberalizations. The econometric technique employed was the Vector Autoregressive (VAR) model. The data from the study was examined with Impulse Response Functions (IRF) and Forecast Error Variance Decomposition (FEVD). The data indicates that increases in trade liberalizations do not substantially enhance growth in the sample nations of the study. Conversely, fiscal and foreign policy shocks tend to catalyze economic growth.

Umechukwu et al. (2024) Examined the effects of trade liberalization on Nigeria's agricultural and industrial productivity between 1970 and 2020. We utilized data from the following sources: The World Bank's World Development Indicators (WDI) for the years 1970–2020; the National Bureau of Statistics; the CBN online database; the International Financial Statistics; and the statistical report bulletins of the Central Bank of Nigeria (CBN). Ordinary Least Squares was employed for analysis using EViews. Upon verifying the stationarity of the data through an ADF unit root test, we employed an Error Correction Model to stabilize the non-stationary data, then affirming incidence of a long-term association among the variables

with a co-integration test. Trend analysis indicates that, during the specified time frame, GDP growth in agriculture was stable, whereas GDP growth in manufacturing experienced a decline. The work demonstrated that trade openness shows positive and significant effect on agricultural GDP at 1% level, but shows no substantial correlation with industrial GDP regarding the effect of trade liberalization policies on their respective outputs. The report presents several policy proposals to the government aimed at enhancing the manufacturing sector's contribution to GDP, including initiatives to assist both large and small-scale businesses.

Agbarakwe and Bredino (2024), studied the impact of trade liberalization on GDP in Nigeria. Real gross domestic product (GDP) served as the metric for evaluating economic growth, while trade liberalization was analyzed through the grade of openness. The rheostat variables included exchange rate and inflation. The Central Bank of Nigeria supplied the variables for the study, as previously stated. We employed the Fully Modified Ordinary Least Squares (FMOLS) method to estimate the models and assessed data stationarity using the Augmented Dickey-Fuller (ADF) test. The findings indicate that real GDP exhibits a positive and statistically significant correlation with levels of openness. Liberal trade policies are expected to foster economic growth, as evidenced by prior results. Nonetheless, development and economic growth are separate concepts. Historical and empirical evidence from Nigeria indicate that the nation has not profited from free trade policy. Due to its historically low productive capability, Nigeria persists in consuming more energy than it produces. Moreover, domestic production capacity has not been established. This article contends that trade policy must be meticulously formulated and implemented by the government.

Ita et al. (2023), studied the impact of trade liberalization on economic growth in Nigeria. The time series data on the examined variables were analyzed using ARDL and ECM econometric methods, together with the Toda-Yamamoto causality test. Findings from the study indicate a positive and significant correlation between the export value index and economic growth in both the short and long term. The export value index exhibits a positive correlation with growth in both directions. Consequently, they asserted that trade policies should promote diversification inside Nigerian enterprises. This study's results demonstrate that trade liberalization substantially enhances economic growth by optimizing industrial responsiveness.

Wasurum and Tamunowariye (2022), undertook a cross-sectional study of selected ninety-three countries which covered the period 1990 to 2021. It was to determine relationship between trade liberalization and productivity. Regression result from the data obtained for the study show that liberal trade policies proved faster growth in the applicable countries than their counterparts which practice protectionism policies. However, it is show that protectionism will not augur well for developing countries that are struggling to find their feet in industrial development. Strict trading policies is averse to welfarism and will further limit consumer choices of goods and services. Beyond this, trade volumes, foreign investments and competition are likely to receive a boost with liberal policies.

Researchers Nteegah, Nelson, and Vincent (2017), investigated the impact of trade liberalization on GDP in Nigeria. It employed Auto Distributive Lag Model to analyze the time series data. Findings showed that oil exports and non-oil imports exerted a substantial positive influence on economic growth in the short and long run. The findings indicate that broadening the product range and improving local oil exploration capabilities may result in increased oil exports. The industrial retort rate of trade openness is positively influenced by the results and recommendations outlined above. Therefore, it is plausible to conclude that Nigeria's industrial sector will gain in trade liberalization policy.

In their 2015 study, Olowe and Ibraheem investigated the impact of trade openness on GDP in several developing countries. The paper analyzed neo-classical growth theory, partially relying on the concepts of partial capital mobility. The disparities in anticipated rates of convergence between open and closed economies were shown to be proportional to the share of factor income derived from physical capital. Researchers identified insignificant correlation in trade openness and GDP. However, developing countries growth is driven by trade liberalization, supported by the accumulation of productive factors.

3. Method of Study

Model specification of our study is based on the work of Agbarakwe and Bredino (2024) with modification. They studied the effect of trade liberalization and economic growth in Nigeria (1981 – 2022). Functional model of the study is;

RGDP = f (DOP, ER, INF)

(3.1)

Where:

RGDP = Real Gross Domestic Product

DOP = Degree of Openness

ER = Exchange Rate

INF = Inflation Rate

Our study adopted Index of Industrial Production as proxy for industrial response (NDP), the dependent variable and disaggregate trade liberalization where Trade Openness (TPN), Foreign Direct Investment (FDI), Import

Penetration Ratio (MPR) and Exchange Rate (EXR) were the independent variables. Functional relationship is thus;

$$NDP = f(TPN, FDI, MPR, EXR) \quad (3.2)$$

mathematical model of (3.1) is;

$$NDP = \beta_0 + \beta_1 TPN + \beta_2 FDI + \beta_3 MPR + \beta_4 EXR \quad (3.3)$$

Whereas, linear econometric form of model (3.1) thus;

$$NDP = \beta_0 + \beta_1 TPN + \beta_2 FDI + \beta_3 MPR + \beta_4 EXR + U \quad (3.4)$$

Where;

NDP = Index of Industrial Production a proxy for industrial response

TPN = Trade Openness a proxy for trade liberalization

FDI = Foreign Direct Investment a proxy for trade liberalization

MPR = Import Penetration Ratio a proxy for trade liberalization

EXR = Exchange Rate (Control Variable)

$\beta_1 - \beta_4$ = slopes of TPN, FDI, MPR, and EXR

β_0 = Autonomous components of industrial response

U = Error Term

NDP, TPN, FDI, MPR, and EXR earlier defined.

Apriori expectation

a priori it is that $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 > 0$, and $\beta_4 < 0$

The sign $\beta > 0$, implies a positive relationship between NDP and the explanatory variables.

Data Sets and Estimation Techniques

Data on Industrial Response (NDP), Trade Openness (TPN), Foreign Direct Investment (FDI), Import Penetration Ratio (MPR), and Exchange Rate (EXR) were compiled from Statistical Bulletin publications from the Central Bank of Nigeria for the years 1990–2024. The Bound test result was ultimately derived by assessing the data through the Auto Regressive Distributed Lag (ARDL) method. The choice being as a result of the reliability of the outcome when the parameters of the variables are 1(0) and 1(1).

4. Data Analysis, Presentation Results and Discussion

This article delineates five steps of empirical data analysis. The procedure commences with the analysis of data through descriptive statistics, followed by the execution of the unit test. Supplementary diagnostic assessments, co-integration bound tests, and ARDL short- and long-term estimations were conducted.

Descriptive Statistics

Table 4. 1: Descriptive Statistics

	NDP	TPN	FDI	MPR	EXR
Mean	124.2171	36.57483	1.274536	16.16540	198.8671
Median	129.2000	34.45783	1.196726	17.43000	131.2743
Maximum	158.9000	53.27796	2.900249	21.66000	1478.965
Minimum	88.40000	20.72252	-0.039127	9.510000	8.038285
Std. Dev.	23.86809	8.086683	0.839325	3.376454	263.6575
Skewness	-0.183480	0.186753	0.221604	-0.243610	3.509628
Kurtosis	1.721450	2.694126	1.896684	2.034596	17.16925
Jarque-Bera	2.580300	0.339887	2.061705	1.705360	364.6382
Probability	0.275230	0.843712	0.356703	0.426271	0.000000
Sum	4347.600	1280.119	44.60875	565.7889	6960.348
Sum Sq. Dev.	19369.31	2223.411	23.95187	387.6150	2363520.
Observations	35	35	35	35	35

Source: *Author's Computation (2025)*

The data indicates that the average Industrial Response is 124.2171, with a standard deviation of 23.86809. The kurtosis of Industrial Response is 1.721450, signifying it is platykurtic, meaning it is below 3. The skewness is -0.183480, suggesting a long-left tail. The series comprises numerous values below the sample mean, signifying a low distribution.

The standard deviation of trade openness is 8.086683, whereas the mean is 36.57483. The positive skewness value of 0.186753 indicates a long right tail for Trade Openness, while the kurtosis value of 2.694126 signifies a platykurtic distribution, both being less than 3. The series comprises numerous values beneath the sample mean, signifying a low distribution.

The mean value of foreign direct investment is 1.274536, with a standard deviation of 0.839325. Foreign Direct Investment exhibits a long right tail characterized by a positive skewness of 0.221604 and a platykurtic distribution with a kurtosis of 1.896684 (i.e., below 3). The series comprises numerous values below the sample mean, signifying a low distribution.

The Import Penetration Ratio has a mean value of 16.16540 and a standard deviation of 3.376454. A skewness score of -0.243610 signifies that the Import Penetration Ratio is left-

skewed, while a kurtosis value of 2.034596 (below 3) suggests that the MPR is platykurtic. This signifies that the series exhibits a uniform distribution, with minimal values residing beneath the sample mean. The Exchange Rate data set exhibits the following statistical characteristics: a mean of 198.8671, a standard deviation of 263.6575, a skewness of 3.509628 (suggesting a long right tail), and a kurtosis of 17.16925 (exceeding 3), indicating a peaked distribution.

The Jarque-Bera statistics of the variables provide another significant observation in this table. Values below 5.99 for the Exchange Rate signify that the variable does not conform to a normal distribution, while values below 5.99 for Industrial Response, Trade Openness, Foreign Direct Investment, and Import Penetration Ratio suggest that these variables adhere to a normal distribution.

Unit Root Test

The outcomes of the ADF unit root test can be found in Table 2. Industrial Response (NDP), Foreign Direct Investment (FDI), the Trade Penetration Ratio (MPR), and the Exchange Rate (EXR) all maintained their initial disparities, while Trade Openness (TPN) remained stable at consistent levels. The disparity between the crucial values of ADF statistics test at the 5% level of significance and the observed values illustrates this point.

Table4. 2: Unit Root Test Results

Augmented Dickey Fuller (ADF) Test					
Variables	Level	5% Critical Values	1st Diff.	5% Critical Values	Status
NDP	-1.436650	-2.951125	-6.348789	-2.954021	I (1)
TPN	-3.244427	-2.951125	-	-	I (0)
FDI	-2.413611	-2.951125	-7.100581	-2.954021	I (1)
MPR	-2.797819	-2.951125	-5.855207	-2.954021	I (1)
EXR	-1.172855	-2.951125	-6.510840	-2.954021	I (1)

Source: *Author's Computation (2025)*

Bound Test Result

We must employ the Bound Cointegration test rather than the Engle-Granger and Johansen cointegration due to differing integrating orders of the series, specifically I(0) and I(1) (Salisu, 2016). Refer to Table 3 for the results of the Bound Cointegration test. The calculated F-statistic in the ARDL estimated model is 5.624013, exceeding the upper critical bound test. This indicates that, at present, there exists a long-term association among the model variables.

Table 4.3: ARDL Bound Test Result

Test Statistic	Value	K
F-statistic	5.624013	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: *Author's Computation (2025)*

Short Run Estimation Result

Table 4. 4: Short Run Coefficients Using the ARDL Approach

Short Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (NDP (-1))	0.404739	0.231523	1.748160	0.0958
D(TPN)	0.140383	0.418799	0.335204	0.7410
D (TPN (-1))	0.847785	0.082805	10.23832	0.0000
D(FDI)	10.209984	4.774085	2.138626	0.0450
D(MPR)	1.575494	1.387211	1.135728	0.2695
D (MPR (-1))	-2.924505	1.206951	-2.423051	0.0250
D(EXR)	0.067833	0.026391	2.570273	0.0142
ECM (-1)	-0.721429	0.219557	-3.285841	0.0037
R-Square = 0.651786; Adj-R-Square = 0.624399; F-statistic = 23.79860 (Prob(F-statistic) = 0.000000; D.W = 1.914759				

Source: *Author's Computation (2025)*

The model's lagged error correction term ECM, as presented in Table 4.4, captures the long-run dynamics between the cointegrating series and is significant at the 5% level. The coefficient indicates that 72% of the actual changes from the previous year have been corrected, as the data were collected annually. This indicates that any errors are rectified within one year. The ECM validates the short-term relationships among the variables and elucidates the long-term associations of the independent variables with the model's Industrial Response. The explanatory variables explain for around 62% of the overall variation in Industrial Response, as seen by the calculated adjusted R^2 of 0.624399. Exogenous factors included in the error term explain 38% of the variation. At the 5% significance level, the F-statistic is 23.79860, with a corresponding Prob(F-statistic) of 0.0000. The findings indicate that the model is statistically significant at the 5% level. The model has no serial autocorrelation, as evidenced by a Durbin-Watson statistic of 1.914759.

The table indicates that the short-run coefficient of trade openness is 0.847785, signifying a 0.847785 unit increase in industrial response (NDP) for each unit increase in trade openness. The trade openness coefficient is significant at level of 5% using Industrial Response (NDP) for the specified time period. The study reveals significant correlation between Industrial Response and Foreign Direct Investment (FDI), with positive coefficient of 10.209984 in the short run, indicating that FDI enhances Industrial Response by 10.209984 units for each unit increase. The Import Penetration Ratio, with a value of -2.924505, signifies that Industrial Response decreases by 2.924505 units for each unit increase in the Ratio. The coefficient is significance at level of 5% when associated with Industrial Response (NDP). Throughout the research period, a statistically significant positive correlation was observed between Industrial Response and the Exchange Rate (r=0.067833), indicating that an increase of one unit in the Exchange Rate results in a 0.067833 unit increase in Industrial Response.

Long Run Estimation Results

Table 4. 5: Estimated Long Run Coefficients Using the ARDL Approach

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TPN	-1.025937	0.912335	-1.124518	0.2741
FDI	3.530973	5.989563	0.589521	0.5621
MPR	5.824114	2.432668	2.394126	0.0266
EXR	-0.204942	0.060406	-3.392723	0.0029
C	93.601524	22.738835	4.116373	0.0005

Source: *Author's Computation (2025)*

Table 4.5 indicates long-run coefficient of trade openness (TPN) is -1.025937, signifying that for each unit increase in TPN, there is a corresponding decrease of 1.0259375 units in industrial response (NDP). At the 5% level of significance for the specified period of time, the coefficient does not demonstrate significant Industrial Response (NDP). A long-run coefficient of 3.530973 for FDI signifies positive correlation between FDI and Industrial Response (NDP), whereby a one-unit increase in FDI results in 3.530973-unit increase in NDP. No statistically significant correlation exists between the coefficient of FDI and Industrial Response (NDP) during the period of our study. A positive long-run coefficient of 5.824114 for the Import Penetration Ratio (MPR) signifies that Industrial Response rises by 5.824114 units for each unit increase in the MPR. At the 5% significance level, the Import Penetration Ratio (MPR) coefficient exhibits an Industrial Response. Over time, Industrial Response (NDP) decreases by 0.204942 units for each unit increase in the Exchange Rate (EXR), as evidenced by the negative coefficient of -0.204942. Throughout the duration of our investigation, this was markedly correlated with Industrial Response (NDP).

Post Estimation Test Results and Analysis

We adopted Breusch-Godfrey Serial Correlation LM Test, heteroscedasticity (Breusch-Pegan-Godfrey Test), and normality (Jarque-Bera Statistics) to ascertain the autocorrelation position of the variables.

Table 5: Diagnostic Test Results

Test	Results	Prob. Value
Linearity Test	2.663110	0.1192
Breusch-Godfrey Serial Correlation LM Test	0.164964	0.6892
Breusch-Pagan-Godfrey Test	1.023810	0.1788

Source: *Author's Computation (2025)*

The linearity test, employing the Ramsey Reset test, produced an F-statistic of 2.663110 and a Chi-Square probability value of 0.1192. The findings indicate that the critical value exceeds 5% (0.05), suggesting that the model is linear, and the probability value is roughly 12% (0.1192).

The Breusch-Godfrey Serial Correlation LM Test were employed to assess serial or autocorrelation of the study. The F-statistic was 0.164964, and the Chi-Square probability was 0.6892. Consequently, there were no serial correlation in the model of our study hence, the probability value of about 69% (0.6892) exceeds the critical threshold of 5% (0.05). Despite the Breusch-Pagan-Godfrey test for heteroscedasticity producing an F-statistic of 1.023810 and a Chi-Square probability of 0.1788, we may dismiss the presence of heteroskedasticity in our model, as the Chi-square likelihood of approximately, 77% exceeds the 5% threshold ($p>0.05$).

Discussion of Findings

Our result show that Trade Openness (TPN) increases Industrial Response (NDP) in the short run while in the long run, it increases Industrial Response (NDP), implying that Trade Openness (TPN) indicate unstable effect in Industrial Response (NDP) in Nigeria. In the short run, it stimulates economic activity because opening up trade allows industries to import cheaper raw materials, intermediate goods, and capital goods. This lowers cost of production and boosts industrial output (NDP). Nevertheless, over time, the initial gains may not be sustained, especially in developing countries as trade openness without competition leads to import dependence. Also, domestic industries face tough competition from cheap and higher-quality foreign goods, leading to decline in local production. This finding supports previous studies of Adamu & Doğan (2017), Iheanacho (2017), Alugbuo & Uremadu (2020), Okjo et al. (2020), and Ekeagwu et al. (2023).

Our finding also shows that Foreign Direct Investment (FDI) increases Industrial Response (NDP) in Nigeria in the short and long run signifying, Foreign Direct Investment (FDI) has stable effect on Industrial Response (NDP) in Nigeria. The finding supports previous studies conducted by Etukafia, Ekpo & Asogwa (2015), Osuji (2015), Bank-Ola et al. (2020), and Keji et al., 2023). FDI brings in foreign capital, which helps local industries expand their production capacity. Both in the short and long run, capital is often invested in equipment, technology, or working capital, stimulating immediate output.

Import Penetration Ratio (MPR) decreases Industrial Response (NDP) in the short run but increases Industrial Response (NDP) in the long run therefore, expressing that Foreign Direct Investment (FDI) has unstable effect on Industrial Response (NDP) in Nigeria. The finding corroborates the previous investigations of Alugbuo & Uremadu (2020), Enikezimene & McDonald (2021), Leera Kpagih et al. (2022), Oloruntuyi & Ojeka (2023), and Unegbu & Ugwunna (2024). Increasing imports in the short run often hurts local industry due to likely import floods of the market with cheaper or higher-quality foreign goods, and undercutting domestic manufacturers. Local industries lose market share, as a result reduced output, or shut down

in most cases. However, in the long run, importation can expose domestic firms to foreign technology, quality standards, and production methods leading to learning-by-importing effects which may increases Industrial Response (NDP). Exchange Rate (EXR) increases Industrial Response (NDP) in the short run whereas, it reduces in the long run. This implies that Exchange Rate (EXR) has unstable result on Industrial Response (NDP). This finding supports previous studies like Udeagha et al. (2018), Ajayi & Atanda (2019), Oladipo & Okunade (2020), Eze & Okeke (2021) and Nwankwo & Okeke (2022).

Conclusion

Secondary data was utilized to develop time series on the index of industrial production, which acted as proxy for industrial response; explanatory variables encompassed trade liberalization indicators such as trade openness (TPN), foreign direct investment (FDI), import penetration ratio (MPR), and exchange rate (EXR). We calculated the long- and short-run coefficients of the variables utilizing Auto Regressive Distributed Lag (ARDL) Bounds test for co-integration, which served as foundation for our data analysis. Result of the analysis showed different response on parameters adopted for the study which were presented in the preceding segments of our analysis. We conclude that trade liberalization has far more reaching and inherent advantages for developing economies. Nigeria, seemingly will benefit from enhanced technology and quality of life and welfare of her citizens if it strengthens her trade policies that are likely to propel growth as enunciated in the study.

Recommendations

1. Government should promote strong industrial and policies supporting local manufacturer, investment in infrastructure, technology and import-substitution strategies for key industries.
2. Effort should be geared towards export diversification and pull the economy from monolithic oil dependence economy if it must grow and pay attention to human capital development.
3. Foreign direct investment should be implemented in long-term industrial ventures, made to strengthen domestic supply chain, enforce local content requirements, and improve infrastructure like power, roads, sea- ports, etc. including targeting value-added sectors like agriculture-processing.
4. To maximize the long-run benefits of import penetration., improve customs and trade logistics, provide support for SMEs to adapt to global standards.

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