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Macroeconomic Factors Affectng Industrialisation In Nigeria

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Abstract

In consideration of the relevance of industrialisation to sustainable growth and development, this study investigates the determinants of industrialisation in Nigeria. In doing this, the dynamic OLS estimator is employed for analysis of annual time series data spanning the period from 1981-2022. The study finds that FDI, trade openness, exchange rate and government capital expenditure are significant determinants of industrialisation. Specifically, it is found that industrialisation is positively affected by increased FDI inflows and government capital expenditure, and negatively affected by trade openness and currency depreciation. Domestic investment and financial deepening are found to have non-significant effects on industrialisation. Based on the empirical evidence, the study recommends as measures to (further) industrialise the economy: (i) increased government capital expenditure especially expenditure in energy generation (and transmission), transportation, telecommunication, research development and other viable pro-industrialisation capital projects, as industrialisation could be state-assisted; (ii) efforts by the government to enhance the attractiveness of the economy and position same for FDI inflows. (iii) selective trade liberalization with due consideration of infant industry-protection and import-substitution strategies and (iv) strengthening of the local currency using appropriate policies.

Keywords: Industrialisation, Manufacturing Value-added, Foreign Direct Investment, Trade Openness, Exchange Rate, Government Capital Expenditure

JEL Classifications: E51, O14, O25, P33, P45, H54

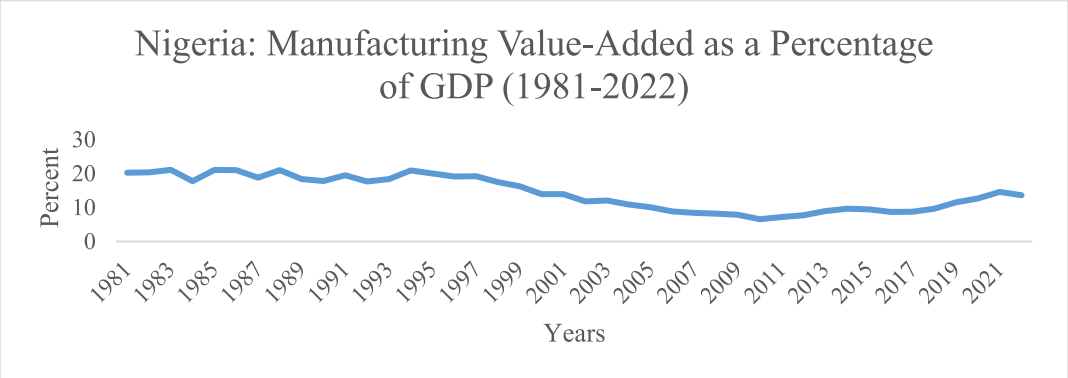
1. Introduction

Industrialisation refers to the shift from primary production to advanced means of production resulting in mass production of valuable output. It is the process of adding value to primary or crude commodities particularly through the manufacturing process using advanced technologies (Rodrik, 2016). Industrialisation is pivotal to sustainable economic growth, development, and poverty reduction. The welfare of the citizens of every nation is hinged on the level of industrialisation of the country (Basakha & Kamal, 2019). It promotes growth (by enhancing productivity, leading to expansion of output), employment (job creation), innovation and optimal resource usage (Ngouhouo & Ewane, 2020; Elfaki et al., 2021). Industrial development has been instrumental to the growth of countries like China, Korea, Taiwan, and Indonesia (Kniivilä, 2007; Elfaki, et al., 2021). Growth episodes recently experienced by some developing countries including Nigeria has been attributed to some improvements in the level of industrialisation.

Highly industrialised countries experience more rapid growth and development than less industrialised countries. The need for countries to consistently pursue industrialisation cannot be overemphasized. The 12th sustainable development goal of the United Nations seeks to "ensure sustainable consumption and production patterns" in member countries by the year 2030. Sustainable consumption is based largely on sustainable production which is achievable through sustainable industrialisation. Hence, the ninth sustainable development goal of the United Nations urges member countries to "build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation" (UNIDO, 2019, p.7).

The level of industrialisation in Nigeria has been quite low. The country is still less industrialised compared to other countries such China, Indonesia, Taiwan, and South Africa that were at same level of development with her about four decades ago. The primary sector especially the agricultural sector and the crude oil and gas sectors with low value addition, account for large portion of the gross domestic product (GDP) (Kida & Angahar, 2016; Afolabi & Laseinde, 2019; Ibitoye, et al., 2022). The contribution of manufacturing value added to GDP fell from 20.26% in 1981 to 13.59% in 2022. During this period, manufacturing valued added as a percentage of GDP ranged between 6.55% (recorded in 2010) and 21.09% (recorded in 1983) and averaged 14.30%. The statistic generally trended downwards especially during the 1999-2009 period. It only improved, though marginally, during the period from 2010-2021, but was less than 20%. These are shown in in Figure 1.

Figure 1.
Trends in Nigeria's Manufacturing Value-Added as a Percentage of GDP)



These unimpressive figures may be attributed mainly to dependence on primary production especially in the agricultural and crude oil and gas sectors which had been the main stay of the nation's economy and have been the major contributors to the nation's GDP according to data from the nation's Central Bank (2023). It can also be attributed to the neglect of the manufacturing sector by successive governments owing to reliance on the crude oil sector. The level of competitiveness of the country's products in the global market has been quite low due to low value-addition as a result of inadequate advanced technology required to process and add value to the primary commodities. Prices of raw (unprocessed) materials or commodities are quite low compared to those of processed or manufactured items in the global markets. Expectedly, the country's non-oil exports earnings have been far less than her payments for imports (comprised largely of manufactures which are of higher value than primary products), resulting in adverse (or negative) balance of trade (BoT) positions over the last four decades (CBN, 2023). The country, being highly import-dependent, and a net importer of manufactured items, incurs huge import bills annually. This has serious implications for the exchange rate of the nation's domestic currency and for domestic inflation. The depreciation of the domestic currency (increase in the nominal exchange rate) resulting therefrom, passes through to consumer prices, resulting in higher inflation (McCarthy, 1999). Moreover, it engenders depletion of the nation's reserves of foreign exchange which is used to facilitate importation of advanced technologies needed to boost domestic production through enhancement of the nation's manufacturing processes.

Nigeria has at different times adopted various industrial development strategies and policies. Some of the policies were integrated in the various national development plans. The first National Development Plan (1962-1968) integrated import substitution industrialisation (ISI) policy. The main objective of this policy was to lessen dependence on imports and conserve foreign exchange reserves by producing locally goods which were hitherto imported. To achieve this objective, several infrastructures were built. These include the establishment of an oil refinery in Portharcourt, a development bank, a print and mint company and energy projects such as the Kainji Dam and Ughelli thermal plants for power generation. The second, third and fourth National Development plans of 1970-1974, 1975-1980, and 1981-1985 respectively, and the Structural Adjustment Programme introduced in 1986 were also targeted at industrialising the economy. However, they failed to achieve this objective for various reasons including over-dependence on foreign know-how, negligence of domestic resources endowment, inadequate technological capacity, heavy dependence on imported machinery, raw materials, and manufactured goods, resulting in gradual depletion of foreign exchange reserves (Chete, et al., 2016a). The economic transformation agenda embodied in the nation's Vision 20:2020 (which was articulated during the Olusegun Obasanjo's administration (1999-2007) and aimed to make Nigeria one of top 20 economies of the world by the year 2020) also had industrialisation has a major focus. The industrialisation strategies of the agenda were aimed at "achieving greater global competitiveness in the production of processed and manufactured goods by linking industrial activity with primary sector activity, domestic and foreign trade, and service activity" (Chete, et al., 2016b, p. 115). This also failed to achieve the industrialisation objective as the contribution of manufacturing sector valued added to GDP fell from 16.26% in 1999 to 12.67% in 2020 according to data from the CBN (2023).

Several studies have been conducted to investigate the impact of industrialisation on economic growth, development, employment, and other macroeconomic variables (Okezie, et al., 2017; Ibitoye, et al., 2022; Effiong & Udonwa, 2024). Most gave empirical evidence that industrialisation is relevant to growth and development. In view of the relevance of industrialization to economic and social well-being, the objective of this study is to identify macroeconomic factors affecting

industrialisation in Nigeria, with a view to recommending policies that are germane to formulating appropriate industrialisation strategies for the country.

The remainder of the study is structured as follows: Section two presents a review of the literature. The section is concluded with the intended contribution to extant knowledge. Section three presents the methodology of the study. Section four presents and discusses the empirical results. Section five concludes the study with evidence-based recommendations and suggestions for further studies.

2. Literature Review

2.1. Theoretical Review

Industrialisation can be attributed to several factors, some of which are external and others internal factors. The factors include trade openness (international trade), exchange rate, FDI, domestic investment, financial deepening, and government (capital) investment. One of the benefits of international trade according to international trade theory is that through international trade, countries can have access to goods, services and technologies that are not locally produced. Knowledge spillovers from advanced to developing countries have also been identified as the most important gains from international trade (Grossman and Helpman, 1990). Trade liberalization or trade openness enhances access of domestic firms to foreign markets for advanced technologies which can be deployed to boost productivity of domestic firms, adding value to primary or crude products, and increasing the firms' output of manufactured goods in the process (Akorsu & Okyere, 2023; Hao, 2023). Thus, trade could be a major determinant of industrialisation if it is not dominated by imports of finished or consumer goods. De-industrialisation could result where a country's imports bills consistently exceeds her exports earnings – an indication that the country is highly dependent on imports – and the import basket is dominated by final, consumer goods.

A major determinant of trade flow is the exchange rate, which is the domestic currency price of a unit of a foreign currency. Trade theory holds that currency depreciation boosts exports and curbs imports, resulting in positive trade balances, *ceteris paribus*. The reasoning is that with currency depreciation (increase in the nominal exchange rate of the domestic currency), a nation's exports become cheaper in foreign markets, bringing about a rise in the demand for the country's exports in foreign markets, while import prices rise in the domestic market engendering fall in the demand for imports. Currency appreciation (fall in the exchange rate) would expectedly have the reverse effect. The anticipated export-effect of currency depreciation will only hold for a country with a large and diversified export sector. Marshall Lerner's theory demonstrates that the effect of exchange rate on trade flow is dependent on the elasticity of demand for a country's export in the foreign market, and the elasticity of demand for imports in the local market. Currency depreciation may not deter demand for imports in a highly import-dependent economy where demand for imports is inelastic. In relation to industrialisation, currency depreciation in such an economy will only serve to increase the domestic prices of foreign (advanced) technologies needed to add value to primary or crude items, adversely affecting industrialisation therein.

In theory, foreign direct investment inflows increase the productivity of firms in the host or recipient countries and also aids to boost productivity, leading to expansion in output (mass production). Apart from increasing the stock of capital needed to boost production (OECD, 2001), it is also acknowledged as a means of technology transfer by multinational corporations (MNCs) which are the main channels of FDI inflow to a host or recipient economy (Wang & Blomström, 1992; Søreide, 2001; Osano & Koine, 2016; Ali et al., 2023). FDI is a stable form of capital (compared to portfolio investment which is quite unstable) and it is the only source of new and innovative technologies which are unavailable through the markets (OECD, 2001). Hence various governments strive to enhance the attractiveness of their economies to inflow of this form of capital. Advanced technology can be deployed to add value to crude or primary commodities through the manufacturing process.

The government also plays a role in industrialisation in developing countries through its expenditure activities, particularly capital expenditure in education, and health and telecommunication

infrastructures (Kim et al., 1995; Takeuchi, 2010). An implication of the Wagner's (1883) Law of Increasing State Activities is that increased government expenditure is needed to initiate and sustain industrialisation (Irandoust, 2019). Thus, industrialisation could be state-assisted.

2.2. Empirical Review

Studies have been conducted to investigate the effects of various factors or variables on industrialisation using different methodologies and different measures of industrialisation. Some of them are reviewed in this subsection.

Gui-Diby and Renard (2015) examined the impact of FDI on industrialisation in Africa. The study employed panel data from 49 countries in the continent, covering the period from 1980 to 2009. The feasible generalized least squares (FGLS) estimator was employed for the data analysis. Industrialisation was measured as manufacturing value-added as a percentage of the GDP. The study found no significant effect of FDI on industrialisation. This was attributed to over-dependence on natural resources, and inadequate government interventions.

Ngouhouo and Ewane (2020) examined the effect of FDI on industrialisation within a panel framework in 23 African countries separated into 12 CFA Franc countries and 11 non-Franc countries during the period from 1990 to 2017. The pooled mean group estimator was employed for the analyses. The study found that FDI contributed positively to industrialisation in the Franc Zone. However, the industrialisation-effect of FDI in non-Franc zone was found to be negative and significant. The differential effects of FDI on industrialisation in the two different zone suggests that the effect of FDI on industrialisation could be dependent on some other variables or zone-specific characteristics. Considering the (short run) results for the each country, the findings cannot be generalized to individual countries in each of the zones. Further evidence from the study is that energy positively and significantly affected industrialisation in both zones. While inflation adversely affected industrialisation only in the CFA franc zone, its effect was non-significant in the non-Franc Zone. The effect of trade on industrialisation was positive and fairly significant (at the 10%) level in the Franc Zone, but non-significant in the non-Franc Zone. The effect of education on industrialisation was found to be negative and fairly significant in the Franc Zone, but positive and highly significant in the non-Franc Zone.

Nnadozie et al. (2021) investigated the effect of FDI on industrialisation in Nigeria during the period from 1981-2015 using multiple linear regression and error correction modeling. In the study, industrialisation was measured as manufacturing value added. The study found that the short- and long-run effects of FDI on industrialisation in the country were non-significant. It also found that trade openness adversely affected industrialisation in the short- and long-long. Agricultural productivity and participation in international trade were also found to adversely affect industrialisation in the short- and long-run.

The effects of FDI and trade openness on industrialisation in Ghana during the period 1983-2019 were investigated in Akorsu and Okyere (2022) using the ARDL and NARDL modeling techniques. The study found that positive changes in trade openness had no significant effect on industrialisation in the short- and long-run, but negative changes in this variable adversely affected industrialisation. The study further found that positive changes in FDI positively affected industrialisation in the long-run. Positive changes in gross fixed capital formation were also found to contribute positively to industrialisation in the country. Other factors found to play a significant

role in promoting industrialisation in Africa include financial development, human capital, institutional quality, infrastructure, and domestic investment.

Paulin et al. (2023) employed panel DOLS and panel FMOLS to investigate the effect of FDI on industrialisation in a sample of 39 African countries during the period from 2006 to 2019. Industrialisation was measured as manufacturing value added as a percentage of the GDP. It was found that FDI positively affected industrialisation, but the effect was dependent on availability of resources and quality of institutions. Chen et al. (2024) investigated the effect of Chinese FDI on industrialisation in Africa using panel data for 36 African countries covering the period from 2003 to 2020. The study employed the instrumental variable-generalized method of moment (IV-GMM) technique for panel data analysis. The study found that Chinese FDI significantly promotes industrialisation in Africa. It also found that the industrialisation-effect of Chinese FDI was larger in high recipient countries than in low recipient countries due to differences in their absorptive capacities.

The effect of trade openness industrialization in Nigeria during the 1981-2016 period was investigated in Ojuolapo et al. (2020) using the ARDL approach to analysis of short-run and long-run relations. The result showed that trade openness had a negative and non-significant effect on industrialization. Mignamissi and Nguekeng (2022) investigated the nexus between trade openness and industrialisation during the period from 1990-2019 using the system GMM estimator. The study found that trade openness positively affects industrialisation in Africa, and as such, it should be prioritized as a fundamental determinant of industrialisation on the continent. However, Amoah and Jehu-Appiah (2022) investigated the determinants of industrialisation in Africa during the period from 1990 to 2018. A panel two-stage least squares technique was employed for the data analysis. The empirical evidence indicated that while trade openness negatively and significantly impacted industrialisation in Africa, the effect of inflation and human capital on industrialisation were not significant. Further evidence from the analysis is that financial development, natural resources and FDI contributed (positively) to industrialisation in the continent. Similarly, Gandjon-Fankem and Feyom (2023) also employed a two-step system GMM technique to investigate the effect of trade openness on industrialisation in sub-Saharan Africa (SSA) during the period from 1985 to 2014. The study adopts three measures of industrialisation namely manufacturing value added as a percentage of GDP, industrial competitiveness index and manufacturing employment as a share of total employment. The study found that SSA de-industrialises with greater openness to international trade. This adverse effect of trade openness on industrialisation was attributed to the low level of FDI and human capital. The variances in the observed effect of trade openness on industrialisation in Mignamissi and Nguekeng (2022) and Amoah and Jehu-Appiah (2022) may be attributed to the differences in time periods covered by both study as they adopted same technology and same measures of the variables, for example both adopted the new index of trade openness proposed by Squalli and Wilson (2011) as it take a country's weight in international trade into account, though Gandjon-Fankem and Feyom (2023) aptly noted with reasons, that the new index is not perfect.

The relationship between exchange rate regimes and industrialisation in Nigeria was examined in a study by Nwosa et al. (2019). The study employed the ARDL technique to analyse time series data spanning the period from 1960 to 2016. The empirical results showed that the effect of exchange rate on industrialization during the entire period was non-significant. However, it found that during the period of flexible exchange rate regimes, exchange rate adversely industrialization. Further evidence from the study was that industrialisation was positively and significantly affected by human capital (using labour force as proxy) and capital stock.

The study by Ramanayake (2019) found that currency depreciation negatively affected industrialisation and FDI inflows and worsened the inflation problem in Sri Lanka. Mlambo and McMillan (2020) examined the effect of exchange rate on manufacturing sector performance in Southern African Customs Union (SACU) states during the period from 1995 to 2016 in a panel framework using the panel FMOLS and PMG estimators. The study found significant negative effects of exchange rate, imports and FDI on manufacturing sector performance in the Union. Exports and inflation were found to have affected manufacturing sector performance positively and significantly. The study by Olatunji (2020) which investigated the effect of exchange rate on industrial growth during the period from 1981 to 2016 found, using the VECM technique that exchange rate, inflation and tax negatively impacted industrial growth in Nigeria. Money supply was found to have positively affected industrial growth in the country.

Iweriebor et al. (2015) examined the effect of government spending on industrial growth (measured as industrial output) in Nigeria during the period from 1980 to 2013. The Engle-Granger two-step approach to cointegration and error correction analysis was employed. The study found that industrial output was not significantly affected by government expenditure in the short- and long-run. Jeff-Ayene, et al (2019) also investigated the effect of government expenditure on industrial development (using index of industrial production as proxy) in Nigeria during the period from 1981 to 2016. The ARDL approach to cointegration and error correction modelling was employed for the analysis. The study also found no significant long run effect of government recurrent and capital expenditure on industrial development in the country. Omankhanlen et al (2021) examined the effect of government expenditure on industrial growth in Nigeria during the period from 1981 to 2018. In the study manufacturing value added in current US$ was used to proxy industrial growth. The Johansen co-integration and VECM were adopted for the data analysis. The study found that gross fixed capital formation and government capital expenditure negatively and significantly affected manufacturing value added in the long run. Inflation and savings were found to have affected manufacturing value added positively and significantly during the period.

The foregoing review of the literature identified various factors affecting industrialisation, though for most of the factors there has been no consensus on the nature of the effects. Thus, the empirical evidence has been inconclusive. The inconclusiveness may be due to differences in variable measurements, methodology, scope, etc. The current study seeks to identify macroeconomic factors affecting industrialisation in Nigeria. A search of the literature focusing on Nigeria reveals that the role of domestic investment in industrialization is yet to be empirically investigated. This gap is bridged in this study. Another contribution of the study to extant knowledge is its application of the single-equation DOLS estimator to determine the macroeconomic variables affecting industrialisation in the country. This technique was adopted because it corrects the problems of endogeneity and heteroskdasticy using a GLS procedure to yield consistent and efficient long run estimates of the regression parameters. Moreover, it can be applied in cases involving variables with higher order of integration which is not possible with most other methods such as ARDL, VECM, etc. adopted in other studies. The study also contributes to existing literature by testing the Wagner's Law using Nigeria's data by investigating the effect of government capital expenditure on industrialisation measured as *manufacturing value added as a percentage of the GDP* as suggested by Dodzin and Vamvakidis (2004), Kang and Lee (2011), UNIDO (2019). This measure adequately captures the capacity of the manufacturing sector to add value to primary or crude items by taking its share of the output or the GDP into consideration.

3. Methodology

3.1. The Model

Based on the various theories reviewed in the section on theoretical literature review of this study, we distilled a functional model to identify the factors affecting industrialisation specified functionally as:

$$\boldsymbol{INDSTR = f\,(FDI, DINV, TOPEN, EXR, FINDP, CAP)} \qquad (1)$$

Where INDSRT stands for industrialisation measured as manufacturing value added as a percentage of GDP in line with Dodzin and Vamvakidis (2004), Kang and Lee (2011), UNIDO (2019); FDI represents net foreign direct investment as a percentage as a percentage of GDP; DINV represents domestic investment measured as gross capital formation as a percentage of GDP in line with the World Bank (2024); TOPEN represents trade openness measured as total trade (sum of exports and imports) as a percentage of GDP; EXR stands for the natural logarithm of the nominal exchange rate (EXRT); FINDP stands for financial deepening measured by credit to the private sector as a percentage of the GDP; CAP represents governmental capital expenditure as a percentage of GDP.

Equation (1) depicts that industrialisation is affected by both external and internal factors.

The theoretical (*a priori*) expectations are: $f_{FDI} > 0, f_{DINV} > 0, f_{TOPEN} > 0, f_{EXR} > 0, f_{FINDP} > 0, f_{CAP} > 0$

FDI and DINV are key factors of production. They are both expected to boost increase addition and boost output. FDI is known to be a key channel of technological transfusion. Inflow of FDI into an economy may complement domestic investment (depending on country specific conditions such as the absorptive capacities of domestic firms). Where this transpires, the stock of capital in the economy increases. Thus, the introduction of new (advanced) productive technologies introduced into an economy through the channel of FDI by MNCs, and the increase in capital stock in the economy which may result from inflow of same, could serve to enhance industrialisation.

Trade openness is also a means of technology transfer resulting from technology imports, and knowledge spillover which results from learning by doing associated with global trade (Falvey, et al, 2004; Veeramani, 2014). Apart from technology, the managerial and technical skills required to boost productivity and add value to primary or crude items (through the manufacturing process) are also imported into the economy through international trade. Thus, all things being, TOPEN is expected to affect industrialisation positively. However, for a country that is less productive, less competitive, and highly dependent on imports, trade openness could have the reverse effect.

The expectation of a positive effect of the exchange rate on industrialisation stems from the theoretical position that currency depreciation boosts exports and curbs imports, all things being equal. The boost in exports enhances exports earnings, which inter alia could be used to import advanced technology to be deployed for production locally, adding value and boosting output thereby. The import curbing effect is not unconnected with the infant-industry protection and import substitution arguments which could be useful in developing and advancing local technology, encouraging domestic production, and enhancing industrialisation thereby. However, for a country that is highly-import dependent as a result of low level of domestic output, and as a result of inelastic demand for imports, large currency depreciation easily passes through to higher domestic inflation. This would imply an increase in the cost of importing foreign

(advanced) technologies required for industrialisation, leading to de-industrialisation or lower levels of industrialisation.

Trade and investment financing are key ingredients of economic growth and industrialisation. The financial system exists to inter alia, provide credit to finance trade, investment, and other economic activities. A well-developed financial system will play this role optimally. Where the financial system is able to provide credit to finance trade and investment particularly to firms in the manufacturing sector, this will enhance the capacity of local firms and subsidiaries of foreign firms in a country to acquire advanced technology, skills, etc. need to enhance value addition and boosts production. Hence financial depth, which is a measure of lending institution to advance credit to the private sector, is expected to enhance industrialisation.

Wagner's Law highlights the role of government in the industrialisation process. Increase in government expenditure such as capital expenditure in energy generation and transmission, transportation, telecommunication, education and health, research, and development, etc. is expected to enhance industrialisation.

The model is specified econometrically as:

$$\boldsymbol{INDSTR_t = \beta_o + \beta_1 FDI_t + \beta_2 DINV_t + \beta_3 TOPEN_t + \beta_4 EXR_t + \beta_5 FINDP_t + \beta_6 CAP_t} + \varepsilon_t \quad (2)$$

The variables are as defined previously. β_o to β_6 are parameters to be estimated. Ɛ is the residual (error) term capturing other variables that affect industrialisation but are not incorporated in the model. *t* indexes current time.

3.2. Estimation Technique

Prior to estimating the model, the variables were tested for unit root using the Augmented Dickey Fuller (ADF) test; and stationarity test using the Kwiatkowski-Phillips-Schmidt-Shin (KPSS), though this was not strictly necessary for the estimation technique employed. Since the DOLS estimator yields long run estimates, it was also considered appropriate to test for cointegration of the variables ab initio. For this, the Johansen and the bounds test procedures were employed.

Estimating Equation (2) using the ordinary least squares (OLS) estimator will yield inconsistent estimates. The OLS assumption that the explanatory variables are uncorrelated with the residuals will certainly be violated since there is the likelihood for each of the explanatory variables to be correlated with the residual term. This is called the endogeneity problem, and it is peculiar with cointegrated variables. Employing the OLS estimator will yield biased and inconsistent estimates. One way to overcome the endogeneity problem is to apply the dynamic OLS (DOLS) estimator, which is a single equation estimator developed by Stock and Watson (1993). The estimator overcomes the endogeneity problem by incorporating the first differences of the explanatory variables as well as their leads and lags in the model, to yield asymptotically efficient (consistent and unbiased) long run estimates. By this transformation, the resulting cointegrating equation error term is orthogonal to the entire history of the stochastic regressor innovations. The DOLS model for this study is specified as:

$$\begin{aligned}\boldsymbol{INDSTR_t =\ \beta_o + \beta_1 FDI_t + \beta_2 DINV_t + \beta_3 TOPEN_t + \beta_4 EXR_t + \beta_5 FINDP_t + \beta_6 CAP_t} + \\ \sum_{j=-k}^{p}\left(\boldsymbol{\beta_1 \Delta FDI_{t-j}}\right) + \sum_{j=-k}^{p}\left(\boldsymbol{\beta_2 \Delta DINV_{t-j}}\right) + \sum_{j=-k}^{P}\left(\boldsymbol{\beta_3 \Delta TOPEN_{t-j}}\right) + \sum_{j=-k}^{p}\left(\boldsymbol{\beta_4 \Delta EXR_{t-j}}\right) + \\ \sum_{j=-k}^{p}\left(\boldsymbol{\beta_4 \Delta FINDP_{t-j}}\right) + \sum_{j=-k}^{p}\left(\boldsymbol{\beta_4 \Delta CAP_{t-j}}\right) + \mathrm{u}_t \end{aligned} \quad (3)$$

Other advantages of the DOLS estimator are its applicability in cases of higher order of integration; its ability to correct the problem of heteroskedasticity using a generalized least squares (GLS) procedure; and its superiority in small samples over alternative estimators (Stock & Watson, 1993; Masih & Masih, 1996; Anastasiou, et al., 2016).

3.3. Data and Data Sources

Data used for the analysis is annual time series data spanning the period from 1981 to 2022. The data were obtained from different authoritative sources. Data on FDI, DINV, TOPEN, EXR, were obtained from the World Bank's World Development Indicators (2023), while data on FINDP and CAP were obtained from the Central Bank of Nigeria statistical Bulletin (2023).

4. Results and Discussions

We begin the analysis by presenting and discussing the summary statistics on the variables used for the study. This is followed by the unit root and stationary tests, and then the cointegration test. The model estimation result is thereafter presented and discussed. Post estimation diagnostics and model stability test results are also presented.

4.1. Descriptive Statistics

The descriptive statistics on the variables used for the study are presented in Table 1 and discussed hereunder. As hinted in the introductory section of this paper, manufacturing sector value-added as a percentage of GDP (INDSTR) averaged 14.30% and ranged between 6.55% and 21.09% during the 1981-2022 period. These statistics show that the country's level of industrialisation has been quite low. The coefficient of variation, (CV, measured as the ratio of standard deviation to the mean, or standard deviation as a percentage of the mean which measure the extent of variation dispersion of observations of the series from or around the mean of the observations) is quite low at 0.35 or 35%. This implies that the observations of the do not vary largely from the average (mean) of the series. The coefficient of skewness of the series is near-zero (suggesting normality), while the coefficient of Kurtosis which is less than 3.00 (1.44 < 3.00) indicates that the distribution is platykurtic. The p-value of the Jarque-Bera statistic is greater than 0.05 (0.12 > 0.05). The normality hypothesis cannot be rejected at the 5% significance level. The inference is that the series is normally distributed.

Net FDI inflows as a percentage of GDP had been quite low, ranging from -0.04% to 5.79%, with an average of 1.44% within the period under review. This reveals that the country did not attract much FDI during the period. The CV of 0.86 or 86% shows large deviation or variation of FDI observation from its mean during the period. The coefficient of skewness is evidently larger than zero, suggesting the series is far from normal distribution. The coefficient of Kurtosis which is greater than 3.00 (6.16 > 3.00) implies that the distribution is leptokurtic. The p-value of the Jarque-Bera statistic is less than 0.05, implying that the series is not normally distributed. Gross capital formation as a percentage of GDP (DINV) averaged 36.03% and ranged between 14.90% and 89.38% during the period under consideration. The coefficient of skewness is larger than zero, implies that the distribution is positively skewed (that is it is skewed to the right). Kurtosis is greater than 3.00, indicating that the distribution is leptokurtic. The CV of 0.51 or 51% expresses moderate dispersion of the DINV observations from their mean value. The p-value of the Jarque-Bera statistic is less than 0.05, implying that the series is not normally distributed.

An average TOPEN value of 31.46 implies that trade contributes minimally to the country's GDP, accounting for only 36.46% of the GDP during the period. Minimum contribution of trade to GDP was 9.14%, while maximum contribution was 53.28%. The CV of 39% implies that the observations of the TOPEN series did not deviate largely from their mean value during the period. The coefficient of skewness is near zero – a pointer to normal distribution, while the kurtosis which is less than 3.00 indicates that the distribution is platykurtic. The p-value of the Jarque-Bera statistic which is greater than 0.05 (0.4285 > 0.05) indicates that the series is normally distributed.

The official ₦/$ exchange rate averaged 115.66 during the period under consideration and ranged between 0.62 and 425.98. The wide range, high standard deviation which exceeded the mean and the CV of 1.03 or 103% all point to the fact that the country's currency massively depreciated, and its exchange rate was very volatile, during the period. The coefficient of skewness indicates that distribution was skewed to the right (that is positively skewed), while the kurtosis indicates that the distribution was leptokurtic. The p-value of the Jarque-Bera statistic indicates that the series is not normally distributed as it is less than 0.05. Financial sector credit as a percentage of GDP (FINDP) averaged 11.66% and ranged between 5.81% and 22.75% during the period. This shows that the nation's financial system lacked depth during the period. The CV of 0.50 or 50% indicates that the distribution of FINDP was moderately dispersed around the mean value. The coefficient of skewness indicates that the distribution was near normality. This is confirmed by the p-value of the Jarque-Bera statistic which approximates 0.05. The kurtosis indicates that the distribution was leptokurtic.

Government capital expenditure as a percentage of the GDP was quite low during the period. It averaged 3.15% and ranged between 0.64% and 9.08%. The CV of 0.55 or 55% indicates that the series was fairly dispersed around the mean value. The series is positively skewed, and its distribution is leptokurtic. The p-value (0.0018) of the Jarque-Bera statistic is less than 0.05. This indicates that the series is not normally distributed.

Table 1
Summary Descriptive Statistics

	INDSTR	FDI	DINV	TOPEN	EXRT	FINDP	CAP
Mean	14.3026	1.4401	36.0335	31.4577	115.6556	11.6576	3.1524
Maximum	21.0983	5.7908	89.3811	53.2780	425.9792	22.7548	9.0842
Minimum	6.5528	-0.0391	14.9039	9.1358	0.6177	5.8062	0.6372
Std. Dev.	4.9756	1.2428	18.4114	12.3569	119.1827	5.5916	1.7336
Skewness	-0.0182	1.7375	1.1389	-0.2149	1.0253	0.6144	1.0796
Kurtosis	1.4410	6.1572	4.1482	2.1147	3.2301	1.6068	4.6061
Jarque-Bera	4.2555	38.5770	11.3862	1.6950	7.4520	6.0387	12.6721
Probability	0.1191	0.0000	0.0034	0.4285	0.0241	0.0488	0.0018
Observations	42	42	42	42	42	42	42

Source: Author's Computation using EVIEWS 9

The trends in these variables are presented in Tables A1-A7 in the Appendix of this paper. Figure A1 shows that the contribution of manufacturing value-added to the GDP was consistently below 22% during the period. This depicts that the country had been under-industrialised over the last four decades. During same period, the country's economy was also not much attractive to FDI inflows. The bulk of FDI that flowed into the economy headed for the extractive sector, especial the oil and gas sectors, with relatively little going to the real sectors. This is explained by the low level of net FDI as a percentage of the GDP. The oscillatory trends in the net FDI inflow as a percentage of the GDP (Figure A2) explains the political and economic instability in the economy which engenders uncertainty leading to outflows of FDI from the country and discouraging inflows of same to the country (Makinde, 2018; Danjuma, 2021). Investment in the country had been dominated mainly by domestic investment. However, it holds very little potential for

industrialisation, which is largely driven by advanced technologies channeled through FDI. Figure A3 shows that domestic investment generally trended downwards between 1981 and 2016. This is attributable to myriads of factors including high inflation, poorly developed infrastructure, tax-regimes that are not pro-investment, high level of imports, and so on (Oyedepo & Okor, 2024; Isaac & Akpan, 2024). Domestic investment began to rise from 2017 due to government efforts to encourage domestic production in key sectors of the economy, as well as patronage or consumption of locally produced goods.

During the period under consideration, the country's economy was gradually integrated with the global economy through implementation of trade liberalization policies. This is depicted in Figure A4 by the upward oscillation of the measure of trade openness between 1986 and 2011. It is pertinent to explain that trade during this period was dominated by imports. The prevalence of imports in composition of the country's engagement in global trade especially non-oil trade has remained unchanged. This explains the persistent negative non-oil balance of trade over the last four decades. The decrease in trade as a percentage of GDP after 2011 may be attributed to efforts by the government to reduce import dependence by encouraging patronage of made-in-Nigeria goods.

The massive depreciation of the country's currency is depicted by the graph of the exchange rate presented in Figure A5 which shows exchange rate rising over years from ₦0.62/$1 in 1981 to ₦425.98/$1 in 2022. The depreciation of the Naira was driven largely by insatiable demand for imports engendered by low level of domestic output, *inter alia*.

In spite of the existence of over 80 commercial banks in the country during the period from1981-2005/2006, the nation's financial system lacked depth as the banks were under-capitalised. They were not well-positioned to provide adequate credit to the private sector (Obianagwa & Eze, 2020). Thus, as shown in Figure A6, credit extended to the private sector as a percentage of the GDP each year during the period (except in 1993) was less than 10%. The 2004-2005 reforms in the sector which had recapitalization (by way of increase in shareholders' funds) as a major element yielded positive results as it brought about emergence of several global and national banks that were well-positioned to provide credit to fund economic activities in the country (Kanu & Isu, 2015). Credit to the private sector as a percentage of the GDP rose from 7.54% in 2006 to 10.58% in 2007, 19.77% in 2008 and 22.75% in 2009. It has remained above 15% since that period, though less than 25%. Thus, there is a dire need to further strengthen, broaden and deepen the nation's financial system to boost their capacity to lend to the private sector.

The trend in government's capital expenditure capital expenditure as a percentage of the GDP shown in Figure A7 is instructive. It shows that capital expenditure as a percentage of GDP was generally higher during the military regime (between 1983 and 1998), than during the new civilian (democratic) regime which began from 1999.

4.2. Unit Root and Stationary Tests

The results of the ADF and PP unit root tests are presented in Table A1 in the Appendix. The results of both tests show that apart from FDI which was stationary at level (and at first difference), other variables were non-stationary (contained unit root) at level, but stationary (did not contain unit root) at first difference. In spite of these, there exists the possibility that a linear combination of the variables will be stationary – that is, there is a tendency for the variables to converge in the long run. This implies that there is a possibility for a long run relationship to exist between them.

4.3. Cointegration Tests

The Johansen cointegration test was adopted to test for long run relationship. The test generates two sub-tests, namely the Trace test and the Maximum Eigenvalue test. The results are presented in Table A2 in the Appendix. While the Trace test indicates two cointegrating equations, the Maximum Eigenvalue test indicates one cointegrating equation, at the 5% significance level. Thus, we infer that the variables are cointegrated.

However, given that the variables are of mixed order of cointegration, and considering that the dependent variable is I(1), the ARDL bounds test for cointegration was also performed to test the robustness of the result of the Johansen cointegration test. The result of the test is shown in Table 2. It shows that the null hypothesis of "no long-run relationship" is rejected even at the 5% level, since the computed F-statistic (4.01) is greater than the upper bound critical value at the 5% significance level. Thus, we can confidently infer that a long-run relationship exists between the dependent variable (INDSTR) and the explanatory variables.

Table 2
ARDL Bounds Test

Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	4.01	6
Critical Value Bounds		
	Lower	Upper
Significance	Bound	Bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99

k = number of explanatory variables
Source: Author's Estimations using EVIEWS 9

Cointegration of the variables also implies that the short-run and the long run relationships can be estimated. However, this study is particularly interested in the long run relationships. An ARDL-based error correction model and a DOLS model were estimated. The DOLS estimator was employed based on the advantages it has over other single equation estimators which were discussed in the methodology section of this paper. Indeed, the results of the DOLS estimator turned out to be more robust, more reliable and had more significant parameters than those of the ARDL-based (error correction and long run) model. Consequent on this, only the DOLS estimates are reported.

4.4. Model Estimation Results

The result of estimation of the DOLS model is presented in Table 3. The results show that the effect of foreign direct investment on industrialisation in Nigeria is positive and significant at the 1% level. A unit rise in FDI as a percentage of the GDP is associated with 1.14 unit rise in manufacturing vale added as a percentage of GDP. This conforms to *a priori* expectation. The implication of this observation is that inflow of FDI contributes positively and significantly to industrialisation (and the development of the manufacturing sector) in the long run in the country. Thus, technology-

transmission of FDI through the multinational corporations operating in the country has aided in enhancing industrialisation (boosting manufacturing productivity, raising value added through the manufacturing process and boosting exports) in the country. This result marks a departure from evidence of similar Nigeria-focused studies such as Nnadozie et al. (2021) and Keji (2023) which either found negative or non-significant effect of FDI on industrialisation. Thus, a contribution of this current paper is that it has demonstrated empirically, that Nigeria requires more FDI inflow to achieve the goal of industrialisation in the long run. The observed near-zero and non-significant effect of domestic investment on industrialisation implies that domestic investment in the country cannot be relied on to industrialise the economy.

The effect of trade openness on industrialisation is negative and significant at the 1% level. A unit rise in the index of trade openness is associated with a 0.25 unit decline in the measure of industrialisation. Though this conflicts with *a priori* expectation, yet it is not unexpected for a highly import-dependent country as Nigeria. This observation is a pointer to the country's position in global trade. It suggests that the import component of the country's engagement in international trade dominates the export component and the import's basket has a preponderance of final, consumer goods (which can be produced locally) over technology equipment required to boost productivity of local firms and enhance their value-addition capacity. Thus, trade openness harms industrialisation in the country. This evidence is in sync with evidence from Amoah and Jehu-Appiah (2022) which also indicated that trade openness adversely affected industrialisation in Africa.

Currency depreciation is observed to be associated with de-industrialisation. This does not conform to *a priori* expectation. A 1% rise in the exchange rate is associated with 1.63% decrease in the contribution of manufacturing value-added to the GDP. This observation can be explained by the pass-through of currency depreciation to domestic prices (inflation) in an import-dependent and export-deficient economy. With currency depreciation, the cost of acquiring foreign technology increases and this adversely affects local manufacturing firms, leading to de-industrialisation. This finding is in sync with evidence from Ramanayake (2019), Nwosa et al. (2019), Olatunji (2020) and Mlambo and McMillan (2020) all of which found that currency depreciation adversely affected industrialisation.

The non-significant coefficient of financial deepening variable implies that the country's financial sector does not contribute significantly to industrialisation in the country. As a matter of fact, the negative sign on the estimated coefficient suggests that allocation of credit by the financial sector to the private sector has been non-optimal, biased, or lopsided against the manufacturing sub-sector which requires credit to develop new protection technology or to import advanced technology to be deployed for production processes. The observed negative effect of financial deepening on industrialization is in sync with evidence from Pascal et al. (2023) which also found that financial development through the credit channel negatively affected industrialisation in the Great Lake countries.

The Wagner's Law of increasing State Activities is validated by the observed positive coefficient of CAP (government capital expenditure), which is also highly significant at the 1% level. A unit increase in capital expenditure as a percentage of GDP is associated with 2.22 unit rise in manufacturing value-added as a percentage of GDP. This finding suggests that industrialisation could be state-assisted: the government has key roles to play in initiating and sustaining

industrialisation in developing countries through increased expenditure in capital (infrastructural) projects such as energy generation and transmission, transportation, education and health, etc. Empirical evidence from (Nkemgha & Nchofoung (2023) showed that infrastructural development enhances industrialisation.

Table 3
Estimated Model

Dependent Variable: INDSTR Method: Dynamic Least Squares (DOLS)		
Variable	Coefficient	t-Statistic
FDI	1.1428***	3.8558
DINV	-0.0014	-0.0212
TOPEN	-0.2516***	-4.8016
EXR	-1.6368***	-3.2924
FINDP	-0.0451	-0.5800
CAP	2.2195***	5.9518
C	21.76065***	4.9719
R-squared	0.9774	
Adjusted R-squared	0.9386	
F-statistic	25.2115	
Prob(F-statistic)	0.0000	
D-W stat	2.2668	
Long-run variance	0.9552	

*** ***indicates statistical significance at 1% level***

Source: Author's estimation using EVIEWS 9

4.5. Model Diagnostics

Several diagnostic tests were conducted on the estimated model to ascertain its reliability. The tests included the Jarque-Bera (JB) test for residual normality, the Breusch-Godfrey (BG) test for serial correlation, the Breusch-Pagan-Godfrey (BPG) test for heteroskedasticity and the Ramsey regression equation specification error test (RESET) for accuracy of the model specification. The results of the tests are summarized and presented in Table 4. The residuals of the model are normally distributed as indicated by the p-value (0.4242) of the JB statistic which fails to reject the normality hypothesis at the 5% level as it is greater than 0.05. The model is neither affected by the problem of serial correlation nor heteroskedasticity as indicated by the respective p-values of 0.3138 for the serial correlation test statistic and 0.5451 for the heteroskedasticity test statistic as they respectively fail to reject the null hypotheses of absence of serially correlated errors hypothesis, and the homoscedastic hypothesis at the 5% level. This is because the p-values are greater 0.05. The Ramsey test for appropriateness and accuracy of the specified model indicates that the model specification is free of errors. Based on these, it can reasonably be inferred that the model is reliable, and suitable for policy formulation.

Table 4
Summary Diagnostic Test Results

Tests	Test Stat	p-value
Residual Normality	1.7153	0.4242
Serial Correlation	1.2784	0.3138
Heteroskedasticity	0.9663	0.5451
RESET	0.4509	0.5137

Author's Estimations using EVIEWS 9

4.6. Model Stability Test

The reliability of an estimated model for policy purposes also depends largely on the stability or consistency of its estimated parameters over time. The Brown-Durbin-Evans approach for testing the constancy of regression parameters overtime developed by Brown et al (1975) was employed in this study. The approach involves plots of the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squared recursive residuals (CUSUMSQ). The plots are shown in Figures 2A and 2B respectively. Both plots lie between the 5% significance critical bounds (dotted red lines). The inference is that the model is structurally stable. Thus, it can be deployed for formulation of evidence-based policies.

Figure 2A
CUSUM

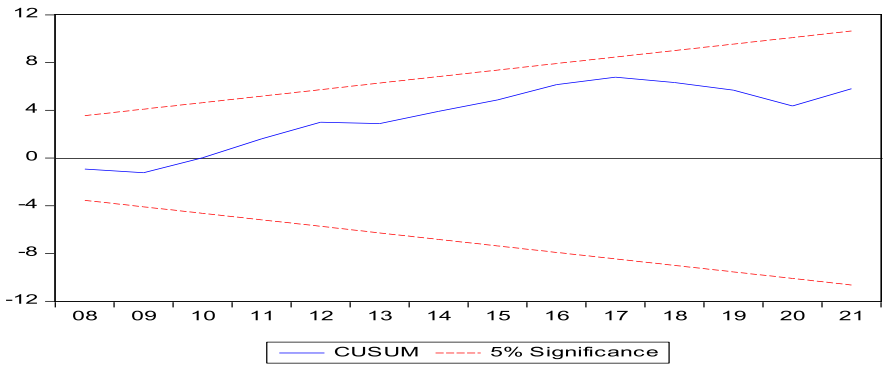
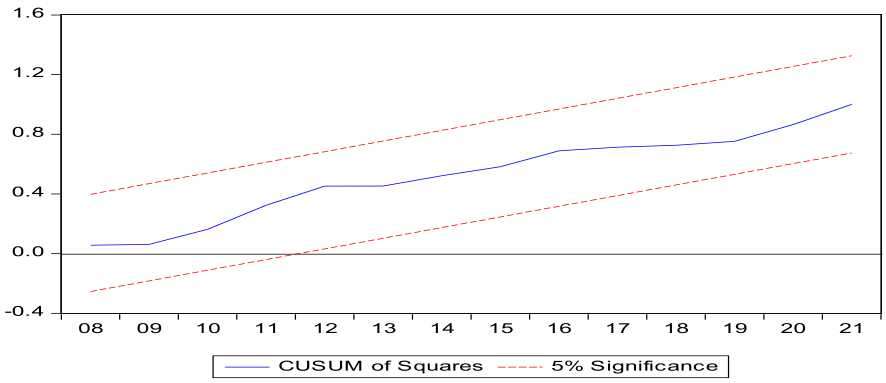


Figure 2B
CUSUMSQ



5. Conclusion and Recommendations

5.1. Conclusion

The paper investigated the determinants of industrialisation in Nigeria using the DOLS technique. In doing this, the effects of net FDI inflows as a percentage of GDP, domestic investment, trade openness, exchange rate, financial deepening, and government capital expenditure on manufacturing value-added as a percentage of GDP were investigated. The conclusion drawn from the analysis is that FDI, trade openness, exchange rate and government capital expenditure are significant factors explaining industrialisation in the country. While FDI inflows and government capital expenditure contribute positively to industrialisation, trade openness and currency depreciation adversely affect industrialisation. Domestic investment and financial deepening are non-significant explanatory factors of industrialisation in the country.

5.2. Recommendations

Based on the empirical evidence, the following are recommended for policy consideration in the country's pursuit of industrialisation:

i. There is a need to enhance the attractiveness of the economy to FDI. This is important considering the role of FDI in technology transfers, which is an imperative for industrialisation.
ii. The role of government in industrialisation is underscored by the observed positive and significant effect of government capital expenditure. There is a need for the government to increase its capital expenditure particularly in energy, transportation, education, and health and telecommunication infrastructure as these can enhance industrialisation.
iii. The observed adverse effect of trade openness on industralisation can be attributed to the country's heavy dependence on import and calls for protection of infant industry and implementation of selective import-substitution policies.
iv. The depreciation of the domestic currency must be addressed by the government using appropriate monetary and fiscal policy actions. The domestic currency must be strengthened to reduce its exchange rate, thereby reducing the domestic cost of acquiring or importing foreign (advanced) technologies needed to enhance industrialisation – boost manufacturing sector productivity – in the country.
v.

5.3. Suggestions for Further Studies

Industrialisation is affected by numerous factors. This study empirically identified some of the factors. This will no doubt serve as a motivation for further studies by researchers who may be interested in further explorations. The effects of other factors such as institutional quality, domestic inflation, interest rate, interest rate differentials, etc. on industrialisation may be investigated to identify more factors affecting industrialisation in Nigeria. This is necessary to aid the country develop appropriate industrialisation strategies so as to set her on the path to sustainable and inclusive growth and development.

References

Afolabi, A. & Laseinde, O.T. (2019). Manufacturing sector performance and economic growth in Nigeria. International Conference on Engineering for Sustainable World. *Journal of Physics*: Conference Series 1378, 032067. https://doi.org/10.1088/1742-6596/1378/3/032067

Akorsu, P. K., & Okyere, S. (2023). Trade openness, foreign direct investment and industrialisation in Ghana. *Cogent Economics & Finance*, *11*(1). https://doi.org/10.1080/23322039.2023.2183638

Ali N, Phoungthong K, Khan A, Abbas S, Dilanchiev A, Tariq S. & Sadiq, M. N. (2023). Does FDI foster technological innovations? Empirical evidence from BRICS economies. *PLoS ONE 18*(3), e0282498. https://doi.org/10.1371/journal. pone.0282498

Amoah, C. & Jehu-Appiah, J. (2022). Factors Driving Industrialisation in Africa: A Panel Two-Stage Least Square Approach. *Modern Economy*, *13*, 144-158. doi: 10.4236/me.2022.132010.

Anastasiou, D., Louri, H. & Tsionas, M. G. (2016). *Non-performing loans in the euro area: are core-periphery banking markets fragmented?* Bank of Greece Working Paper No. 219, December

Basakha, M. & Kamal, S. H. M. (2019). Industrial Development and Social Welfare: A Case Study of Iran. *Socio-Economic Planning Sciences, 68*, 100661, https://doi.org/10.1016/j.seps.2018.10.012

CBN (2023). *Statistical Bulletin*. Central Bank of Nigeria.

Chen, D., Isah, A. B. & Gummi, U. M. (2024). Effect of Foreign Direct Investments on Industrialisation: The Case of China in Africa. *Journal of African Economies, ejad026*, https://doi.org/10.1093/jae/ejad026

Chete, L. N., Adeoti, J. O., Adeyinka, F. M., Ogundele, F. O. (2016a). *Industrial development and growth in Nigeria: Lessons and challenges*. Learning to Compete Working Paper No. 8, African Growth Initiative, African Development Bank Group & UNU-WIDER

Chete, L. N., Adeoti, J. O., Adeyinka, F. M., Ogundele, F. O. (2016b). Industrial Policy in Nigeria: Opportunities and Challenges in a Resource-rich Country, (Chapter 6, pp. 115-135), In Newman, C (ed), *Manufacturing Transformation: Comparative Studies of Industrial Development in Africa and Emerging Asia*. Oxford Academic.

Danjuma, I. (2021). Insurgency, Political Risk, and Foreign Direct Investment Inflows in Nigeria: A Sectorial Analysis. *CBN Journal of Applied Statistics, 12*(2), 27-57.

Dodzin, S. & Vamvakidis, A. (2004). Trade and Industrialisation in Developing Economies. *Journal of Development Economics, 75*(1), 319-328.

Effiong, U. & Udonwa, U. (2024). Industrialisation and Employment Generation in Nigeria: An Empirical Analysis. *African Journal of Commercial Studies, 4*(1), 17-30 https://doi.org/10.59413/ajocs/v4.i1.2

Elfaki. K. E., Handoyo, R. D. & Ibrahim, K. H. (2021). The Impact of Industrialisation, Trade Openness, Financial Development, and Energy Consumption on Economic Growth in Indonesia. *Economies* 9(4), 174; https://doi.org/10.3390/economies9040174

Falvey, R., Foster, N. & Greenaway, D. (2004). Imports, Exports, Knowledge Spillovers and Growth. Economics Letters, 85(2), 209-213

Gandjon-Fankem, G.S. & Feyom, C. (2023). Is trade openness a barrier to industrialisation? Evidence from Sub-Saharan Africa. *Rev World Econ* . https://doi.org/10.1007/s10290-023-00497-2

Grossman, G. M. & Helpman, E (1990). *Trade, knowledge spillovers and growth*. NBER Working Paper no. 3485. Cambridge, Mass.: National Bureau of Economic Research.

Gui-Diby, S. L. & Renard, M-F. (2015). Foreign Direct Investment Inflows and the Industrialisation of African Countries. *World Development, 74*, 43-57.

Hao, Y. (2023). The dynamic relationship between trade openness, foreign direct investment, capital formation, and industrial economic growth in China: new evidence from ARDL bounds testing approach. *Humanities and Social Sciences Communications, 10*(160), 1-11. https://doi.org/10.1057/s41599-023-01660-8

Ibitoye, O. J., Ogunoye, A. A. & Kleynhans, E. P. J. (2022). Impact of industrialisation on economic growth in Nigeria. *Journal of Economics and Financial Sciences, 15*(1), a796. https://doi.org/10.4102/jef.v15i1.796

Irandoust, M. (2019). Wagner on Government Spending and National Income: A New Look at an Old Relationship. *Journal of Policy Modeling, 41*(4), 636-646

Iweriebor, S., Eghaevba, M. I. & Adegboye, A. C. (2015). Government Spending and Industrial Development in Nigeria: A Dynamic Investigation. *Annals of the University of Petroşani, Economics, 15*(1), 179-190.

Isaac, S. E. & Akpan, O. M. (2024). Macroeconomic Determinants of Domestic Investment in Nigeria: Comparing Theory and Empirics. *South Asian Journal of Social Studies and Economics, 21*(3), 194-203.

Jeff-Anyeneh, S. E., Ezu, G. K. & Ananwude, A. C. (2019). Government Expenditure and Industrial Development in Nigeria: Long Run and Short Run Dynamics from ARDL Approach. *Journal of Scientific Research & Reports 23*(6), 1-9.

Kang, S. J. & Lee, H. (2011). Foreign Direct Investment and De-industrialisation. *The World Economy, 34*(2), 313-329.

Kanu, C. & Isu, H. O. (2015). Nigeria's 2005 Bank Recapitalization: An Evaluation of Effects and Social Consequences. Research Journal of Finance and Accounting, 6(17), 17-25.

Keji, S. A. (2023). Industrial Output Growth and Foreign Direct Investment in Nigeria. *Future Business Journal, 9*, 58 (2023). https://doi.org/10.1186/s43093-023-00225-0

Kida, M.I. & Anghar, J.S. (2016). Industrialisation and economic growth in Nigeria. *Lafia Journal of Economics and Management Sciences 1*(1), 1–11.

Kim, J-K., Shim, S. D. & Kim, J-I. (1995). The Role of the Government in Promoting Industrialisation and Human Capital Accumulation in Korea. In: Ito, T & Krueger, A. O. (eds): *Growth Theories in Light of the East Asian Experience*, NBER-EAS Volume 4 (p. 181 - 200). University of Chicago Press

Kniivilä, M. (2007). Industrial development and economic growth: Implications for poverty reduction and income inequality In book: *Industrial Development for the 21st Century: Sustainable Development Perspectives*. (pp. 295-332.), Chapter: 3.1. United Nations, Department of Social and Economic Affairs. New York, USA.

Makinde, W. A. (2018). Re-Assessing Effects of Political Instability on Foreign Investment in Nigeria: An Empirical Survey. *Journal of Public Administration, Finance and Law, 13*, 35-52.

Masih, R., & Masih, A. M. M. (1996). Stock-Watson Dynamic OLS (DOLS) and Error-Correction Modelling Approaches to Estimating Long- and Short-Run Elasticities in a Demand Function: New Evidence and Methodological Implications from an Application to the Demand for Coal in Mainland China. *Energy Economics, 18*(4), 315-334.

McCarthy, J. (1999). *Pass-through of Exchange Rates and Import Prices to Domestic Inflation in Some Industrialised Economies*. Bank for International Settlements Monetary and Economic Department, Working Paper No. 79.

Mignamissi, D., Nguekeng, B. (2022). Trade openness-industrialisation nexus revisited in Africa. *Economic Change and Restructuring, 55*, 2547–2575. https://doi.org/10.1007/s10644-022-09401-8

Mlambo, C., & McMillan, D. (2020). Exchange rate and manufacturing sector performance in SACU states. *Cogent Business & Management*, *7*(1). https://doi.org/10.1080/23311975.2020.1787735

Ngouhouo, I. & Ewane, E. I. (2020). The Effects of Foreign Direct Investments on Industrialisation: A Comparative Approach between the Franc and the Non-Franc Zone. *Asian Journal of Economic Modelling, 8*(2), 123–132.

Nkemgba, GG. Z. & Nchofoung, T. N. (2023). *Effect of infrastructure development on industrialization through financial development and human capital in Africa*. Paper presented at the African economic Conference, Addis Ababa, Ethiopia, 16-18 November, 2023

Nnadozie, O. O., Emediegwu, L. E., & Monye-Emina, A. (2021). Does Foreign Direct Investment Matter for Industrialisation in Nigeria? *Zambia Social Science Journal, 7*(1, Article 3), 31-52.

Nwosa, I. P., Adeleke, O. & Kuku, A. (2019). Exchange Rate Regimes and Industrialisation in Nigeria. *African Journal of Business and Economic Research, 14*(2), 91-106.

Obianagwa, C. E. & Eze, N. U. (2020). The 2004 Banking Sector Reforms in Nigeria and Funding Challenges to SMEs: Sharing the Culpability between Lenders and Borrowers. *Journal of Economics and Allied Research, 4*(4), 161-182.

OECD (2001). *Growth, Technology Transfer and Foreign Direct Investment*. OECD Global Forum on International Investment: New Horizons and Policy Challenges for Foreign Direct Investment in the 21st Century, Mexico City, 26-27 November 2001.

Ojuolape, A. M., Adeniyi, D. B., Oshodi, A. F. & Gold, N. O. (2020). Impact of Trade Openness on Industrialization in Nigeria. *Pakistan Journal of Humanities and Social Sciences, 8*(1), 15-22

Okezie, A. C., Nwosu, C. A. & Marcus, S. N. (2017). Industrialisation and Economic Growth in Nigeria. *Journal of Economics and Finance, 1*(1), 1-20

Olatunji, S. A. (2020). Imperative of Exchange Rate Policy for Industrial Inclusiveness in Nigeria: A Cointegration Approach. *Journal of Economics and Allied Research, 2*(2), 78-85

Omankhanlen, A. E., Chimezie, P. O. & Okoye, L. U. (2021). Government Expenditure and Sustainable Industrial Development in Nigeria. *WSEAS Transactions on Business and Economics, 18*, 31-41. DOI: 10.37394/23207.2021.18.4

Osano, H. M. & Koine, P. W. (2016). Role of Foreign Direct Investment in Technology Transfer and Economic Growth in Kenya: A Case of the Energy Sector. *Journal of Innovation and Entrepreneurship, 5*(31), 1-25. DOI 10.1186/s13731-016-0059-3

Oyedepo, E. O. & Okor, O. J. (2024). Determinants of Domestic Investment: Evidence from Nigeria. *African Journal of Economic Review, 12*(1), 87-102.

Pascal, N. R., Achu, M. G. & Gildas, N. T. (2023). Does Financial Development Explain the Industrialization of Great Lakes Countries? A Multidimensional Approach. *International Journal of Finance*, *8*(3), 57–87. https://doi.org/10.47941/ijf.1350

Paulin, D. D. G., Esperence, F. & Salii, A. M. (2023). The Effect of Foreign Direct Investment on Industrialisation in Sub-Saharan Africa: The Role of Institutional Quality. *Euro Economica, 42*(2), 10-21

Ramanayake, S. S. (2019). Impact of Currency Depreciation on Growth, Exports and Industrialization: Evidence from Sri Lanka. *Statica International Journal of Academic Staff, 1*(1), 4-34

Rodrik, D. (2016). Premature Deindustrialisation. *Journal of Economic Growth, 21*, 1–33.

Søreide, T. (2001). *FDI And Industrialisation: Why Technology Transfer and New Industrial Structures may Accelerate Economic Development*. Chr. Michelsen Institute, Working Paper No. 3

Stock, J. H. & Watson, M. W. (1993). A Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems. *Econometrica, 61*(4), 783-820

Takeuchi, N. (2010). *Industrialisation and the role of government*. MPRA Paper 26822, University Library of Munich, Germany.

UNIDO (2019). *Statistical Indicators of Inclusive and Sustainable Industrialisation: Biennial Progress Report 2019,* United Nations Industrial Development Organisation

Veeramani, C. (2014). World's Knowledge Spillovers: Beyond Openness and Growth. *Journal of Economic Integration, 29*(2), 298-328

Wagner A. (1883), Three Extracts on Public Finance, translated and reprinted in R.A. Musgrave and A.T. Peacock (Eds), *Classics in the Theory of Public Finance*, Macmillan [1958].

Wang, J. & Blomström, M. (1992). Foreign Investment and Technology Transfer: A Simple Model. *European Economic Review, 36*(1), 137-155.

World Bank (2023). *World Development Indicators*. The World Bank

World Bank (2024). Metadata Glossary https://databank.worldbank.org/metadataglossary/world-development-indicators/series/NE.GDI.TOTL.ZS

APPENDIX

Figure A1
Nigeria: Manufacturing Value-added as a Percentage of GDP

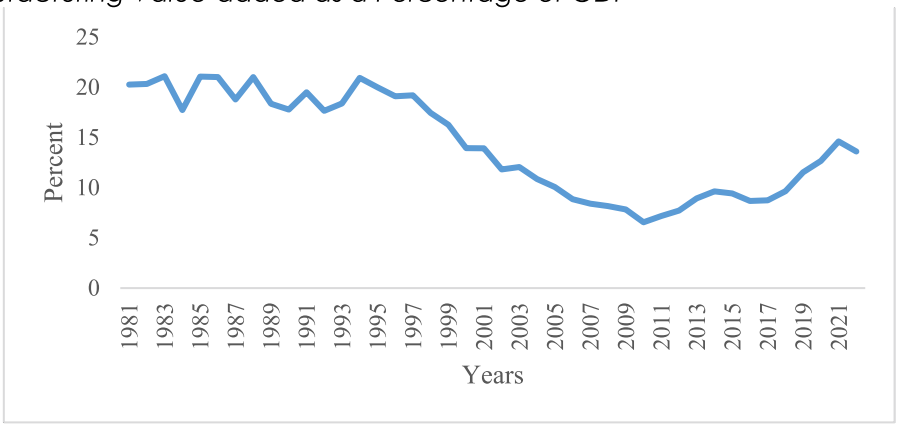


Figure A2
Nigeria: Foreign Direct Investment as a Percentage of GDP

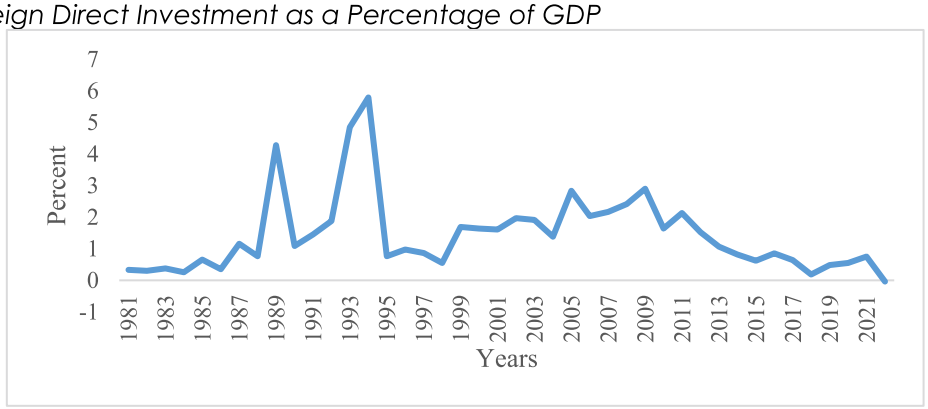


Figure A3
Gross Capital Formation as a Percentage of GDP

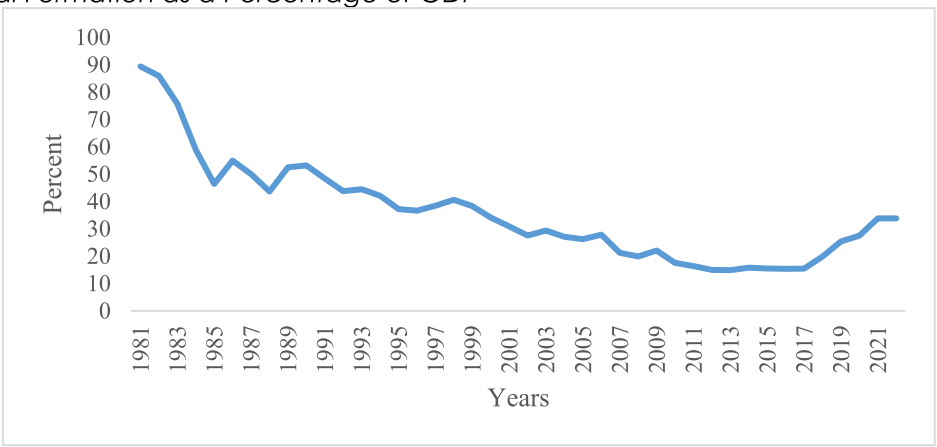


Figure A4
Nigeria: Trade as a Percentage of GDP

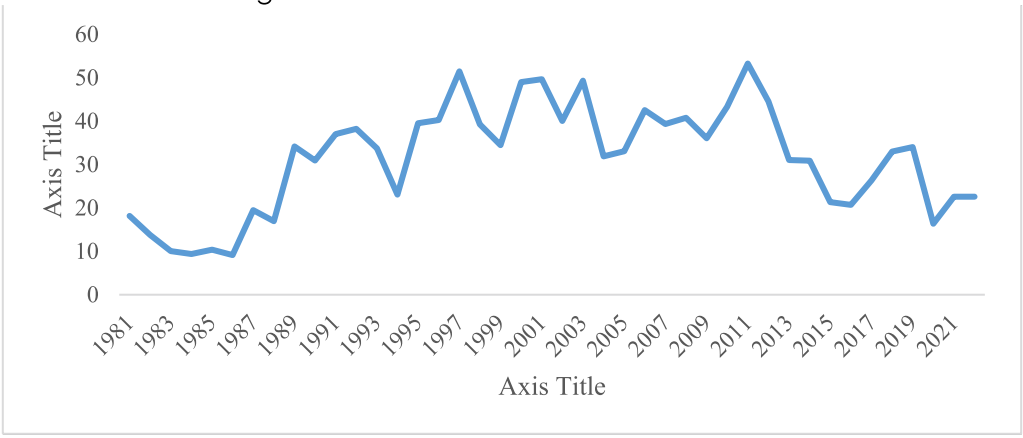


Figure A5
Nigeria: Official ₦/$ Exchange Rate

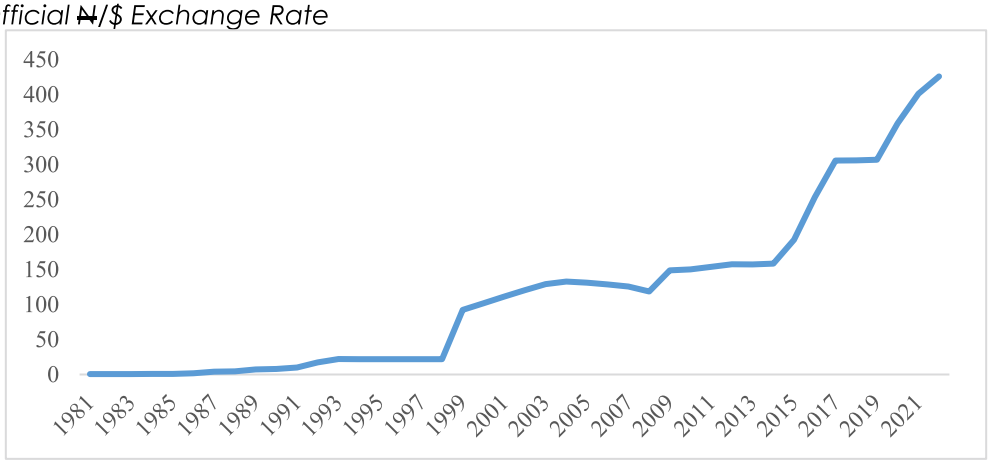


Figure A6
Nigeria: Credit to the Private Sector as a Percentage of GDP

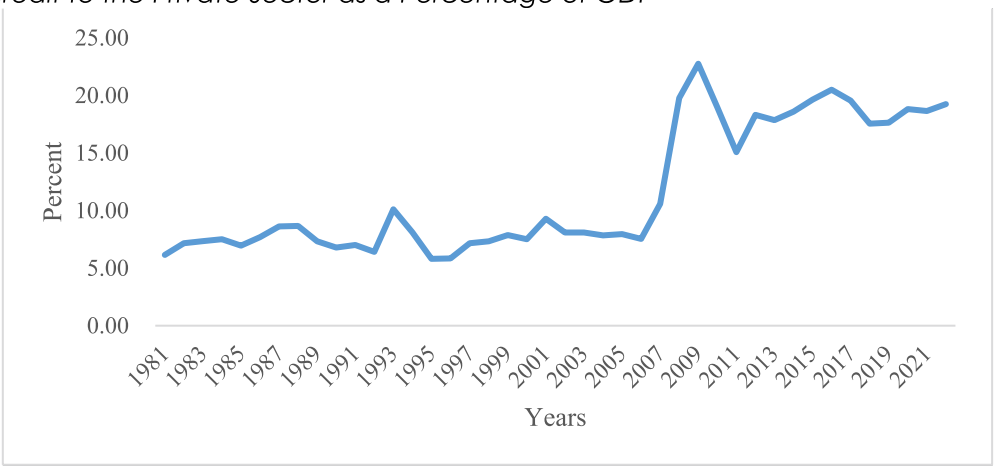


Figure A7
Federal Government's Capital Expenditure as a Percentage of GDP

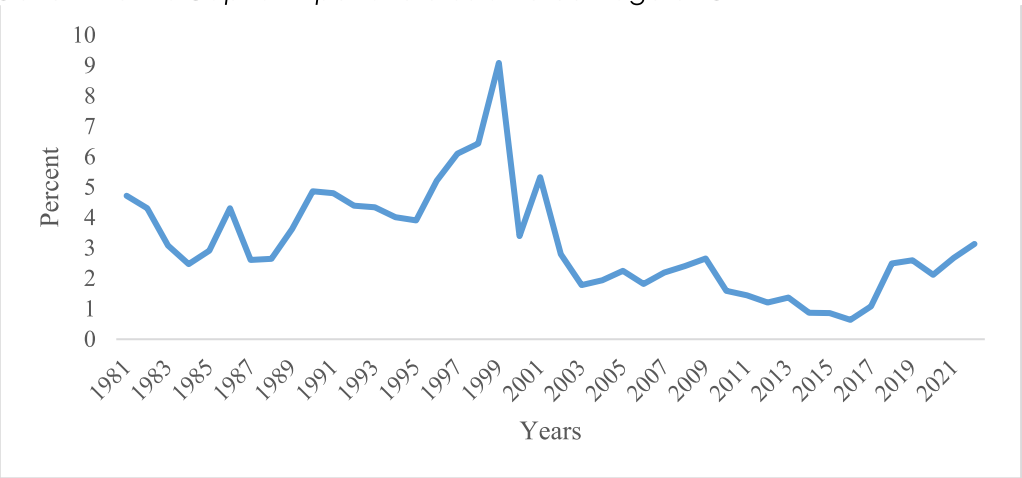


Table A1
Unit Root Tests

ADF Unit Root Tests							
Variables	**Levels**			**1st Difference**			**I(d)**
	test Stat	Critical Value (5%)	Inference	test Stat	Critical Value (5%)	Inference	
INDSTR	-0.8963	-3.5236	NS	-7.6855	-3.5266	S	1
FDI	-3.8022	-3.5236	S	-	-	-	0
DINV	-1.9786	-3.5236	NS	-5.5854	-3.5266	S	1
TOPEN	-2.2371	-3.5236	NS	-5.0081	-3.5578	S	1
EXR	-1.4027	-3.5236	NS	-5.8251	-3.5266	S	1
FINDP	-3.0767	-3.5266	NS	-5.8629	-3.5298	S	1
CAP	-2.8709	-3.5236	NS	-9.0868	-3.5266	S	1
PP Unit Root Test							
Variables	**Levels**			**1st Difference**			**I(d)**
	test Stat	Critical Value (5%)	Inference	test Stat	Critical Value (5%)	Inference	
INDSTR	-1.0072	-3.5236	NS	-7.5607	-3.5266	S	1
FDI	-3.6955	-3.5236	S	-	-	-	0
DINV	-1.9645	-3.5236	NS	-5.5991	-3.5266	S	1
TOPEN	-2.1137	-3.5236	NS	-15.0576	-3.5266	S	1
EXR	-1.4013	-3.5236	NS	-5.9543	-3.5266	S	1
FINDP	-2.2036	-3.5236	NS	-7.7103	-3.5266	S	1
CAP	-2.9289	-3.5236	NS	-9.0868	-3.5266	S	1

I(d) stands for order of integration
Source: Author's Estimations using EVIEWS 9.

Table A2

Johansen Cointgration Test

Sample (adjusted): 1983 2022
Included observations: 40 after adjustments
Trend assumption: Linear deterministic trend
Series: INDSTR FDI DINV TOPEN EXR FINDP CAP
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.720696	153.7731	125.6154	0.0003
At most 1 *	0.585135	102.7549	95.75366	0.0151
At most 2	0.514151	67.56288	69.81889	0.0747
At most 3	0.442788	38.68861	47.85613	0.2729
At most 4	0.222696	15.29624	29.79707	0.7606
At most 5	0.097531	5.219269	15.49471	0.7851
At most 6	0.027476	1.114440	3.841466	0.2911

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.720696	51.01820	46.23142	0.0143
At most 1	0.585135	35.19205	40.07757	0.1604
At most 2	0.514151	28.87426	33.87687	0.1760
At most 3	0.442788	23.39238	27.58434	0.1573
At most 4	0.222696	10.07697	21.13162	0.7374
At most 5	0.097531	4.104829	14.26460	0.8481
At most 6	0.027476	1.114440	3.841466	0.2911

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's Estimation using EVIEWS 9.