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Drivers of Manufacturing Export Performance in Nigeria: An Application of the GMM Estimation Approach

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Abstract

Manufacturing is an industrial component that is widely regarded as the cornerstone of both social and economic development. This study investigates the drivers of manufacturing export performance in Nigeria for the period 1981-2019. Given the existence of endogeneity problem in the model, the study under a dynamic time series estimation employed GMM estimator. Manufacturing exports performance was measured using growth rate of manufactured exports, percentage of manufacturing export in GDP and manufactured export as percentage of total export. The results show that improvement in the degree of trade openness, increasing manufacturing value added, access to financial services, relative prices and increasing investment level through FDI were found to be the determinant factors that have tendency to enhance manufacturing exports performance in Nigeria. Based on these findings, policy implications include providing adequate financing and increasing credit allocation to the manufacturing sector, as well as implementing policies aimed at promoting access to financial services in order to ensure efficient distribution to the preferred sector. The Nigerian government should implement trade barriers-removal policies while also promoting policies that lead to the country's exceptional advancement. Other policy recommendations derived from the empirical findings are thoroughly discussed in the concluding part of the paper.

Keywords: Manufacturing, Exports Performance, Financial Development, Trade Openness, Nigeria.

1. INTRODUCTION

In economic literature, the development gains of developing countries are to transit from exporting primary products to processed manufactured goods (Thirlwall, 2002). Manufacturing sector is considered an industrial component with greatest opportunities for countries to engage in exporting for sustained growth, employment creation, poverty reduction, greater productivity and reserve accumulate through which such country could maintain a favourable balance of payment (UNCTAD & UNIDO, 2011). Countries with increasingly export-oriented manufacturing sector have the tendency to earn huge foreign exchange. Despite these benefits, Nigeria's manufacturing export performance has been declining significantly due to heavy reliance on oil export, making the economy vulnerable to global shocks. For instance, Nigeria's manufacturing share of total merchandise exports peaked at 6.69% in 2010 and has since dropped progressively to 3.46% in 2018, though it increased noticeably to 10.75% in 2019. Still, this is lower relative to oil exports with average share of 90.03% between 2010 and 2019 (World Bank, 2021). Also, Nigeria's share of manufacturing export in GDP fell from 1.45% in 2010 to 0.43% in 2019 (UNCTAD, 2019; World Integrated Trade Solution (WITS), 2020)).

Nigeria's poor performance of manufacturing exports could be ascribed mainly to weak domestic production structure, inadequate provision and poor credit delivery, poor state of infrastructure, and unstable macroeconomic environment, among others. Specifically, poor export performance of Nigeria is associated with weak industrial performance (United Nations, 2016). In particular, a country without a very strong domestic production structure, as reflected in the weak industrial performance, mostly has capability deficiency to produce varieties of goods and services. Hence, trade performance of such country will be very weak. Other noteworthy determinants of manufacturing exports are inadequate provision and poor credit delivery to the sector. Despite the efforts of Nigerian government in establishing some institutional bodies in financing export trade, Nigeria's manufacturing export sector is greatly handicapped largely due to inadequate finance and bank credit in particular. For instance, with

increasing trend of total bank credit allocated to Nigeria's export sector, percentage share of this credit to non-oil for three decades is significantly low (accounting for 5.82%, 0.52% and 6.84% of total bank credit to the Nigerian economy) in 1999, 2009 and 2019, respectively (Central Bank of Nigeria (CBN), 2019)). Also, the performance of Nigeria's manufacturing sector in exports has been hindered due to high interest rate on credit extended to the sector, as it ranges between 15-20% (Ningi, 2013; CBN, 2019).

In addition, Nigeria has high deficit of infrastructure. In comparison to the international standard of 70% of GDP, the overall stock of infrastructure is estimated to account for 20% of GDP (National Planning Commission, 2015). Poor infrastructure development rates have historically been caused by poor infrastructure spending in the public and private sectors (National Planning Commission, 2015). Poor state of infrastructures, characterized by unstable power and water supplies, lack of efficient telecommunication and transportation systems obstruct Nigeria's manufacturing output and exports performance (Akinlo, 1996). In consequence, efficient operations of manufacturing firms in the country are constrained as they are required to invest huge capital and carry high cost structure in order to provide alternative infrastructural facilities. Unstable macroeconomic environment associated with exchange rate fluctuations in the country has also been a serious challenge to manufacturing exports.

The contribution of this paper to the existing studies is anchored on the following gaps: First, it is observed that majority of erstwhile studies focused exclusively on determinants of manufacturing exports, but this present study looks at the twin issue of determinants and performance of manufacturing export. It is worth noting that there are few studies that investigate the determinants of manufacturing export performance (MEP), with the exception of van Dijk (2002), who measured manufacturing export performance using propensity to export, defined as the export-to-production ratio. In this study, the performance of manufacturing export is measured using three different indicators: growth rate of manufactured exports, percentage of manufacturing export in GDP, manufactured export as a percentage of total export. The rationale for this is that, unlike the export-to-production ratio, the three approaches provide a broader perspective for measuring MEP. In addition, a robustness analysis was performed. Second, due to the potential endogeneity problem between manufactured exports and foreign income measured by global GDP, which is related to measurement error, the use of the generalized method of moments (GMM) estimator is appropriate because it helps to solve such a problem. Furthermore, the GMM estimator is thought to be more efficient and is generally found to be valid in cases of large samples. Third, there is a dearth of such studies conducted for Nigeria, except Söderbom and Teal (2002), who analyze the determinants of exports using the Nigerian Manufacturing Enterprise Survey (NMES). Thus, this study considers both the demand and supply factors that determine manufacturing exports in Nigeria. It is observed that over-reliance on primary products has not been fruitful and even exposed the economy to unfavourable shocks. It has also been argued that sustainable and inclusive growth, employment generation, poverty reduction and reduced vulnerability to external shocks cannot be guaranteed for a country with a limited production base and export concentration on primary products. Hence, this paper was designed to examine the performance of manufacturing exports in mitigating the aforementioned problems in Nigeria. This is part of what motivates the study. Thus, the objective of this paper was to evaluate the drivers of Nigeria's manufacturing export performance.

After the foregoing introductory section is section 2 which covers literature review and section 3 which focuses on theoretical framework, empirical model, and estimation techniques. Section 4 presents the empirical results with discussion, while section 5 concludes the paper with policy recommendations.

1.1 Stylized facts on the trends of some of the determinants of manufacturing exports performance in Nigeria

This subsection describes the trends of some of the determinants of manufacturing exports performance in Nigeria.

1.2 Trends of Manufacturing, value added (annual % growth) in Nigeria

One of the performance indicators of manufacturing exports is the growth rate of manufacturing value added (MVA). Over the period 1981-2019, the growth rate of Nigeria's MVA has been fluctuating and even recorded a negative growth rate. For instance, between the periods 1981-1986, 1994-1995, 2003-2004, Nigeria experienced a persistent negative growth rate in its MVA (Fig 1). In 2005, a positive growth rate was recorded at 2.3% though fell significantly in 2007 by about 95.9%. Between 2008 and 2014, the growth rate of MVA maintained positive and recorded on average 10.9%. Again in 2015, the country's MVA recorded a negative growth rate of -1.46% and this persists until 2017. The dwindling situation of manufacturing sector during this period could be ascribed as the main source of the economic recession which the country underwent between 2015 and 2017. In 2019, manufacturing exports as a percentage of merchandise exports rose to 0.77% though lower compared to 2.09% in 2018.

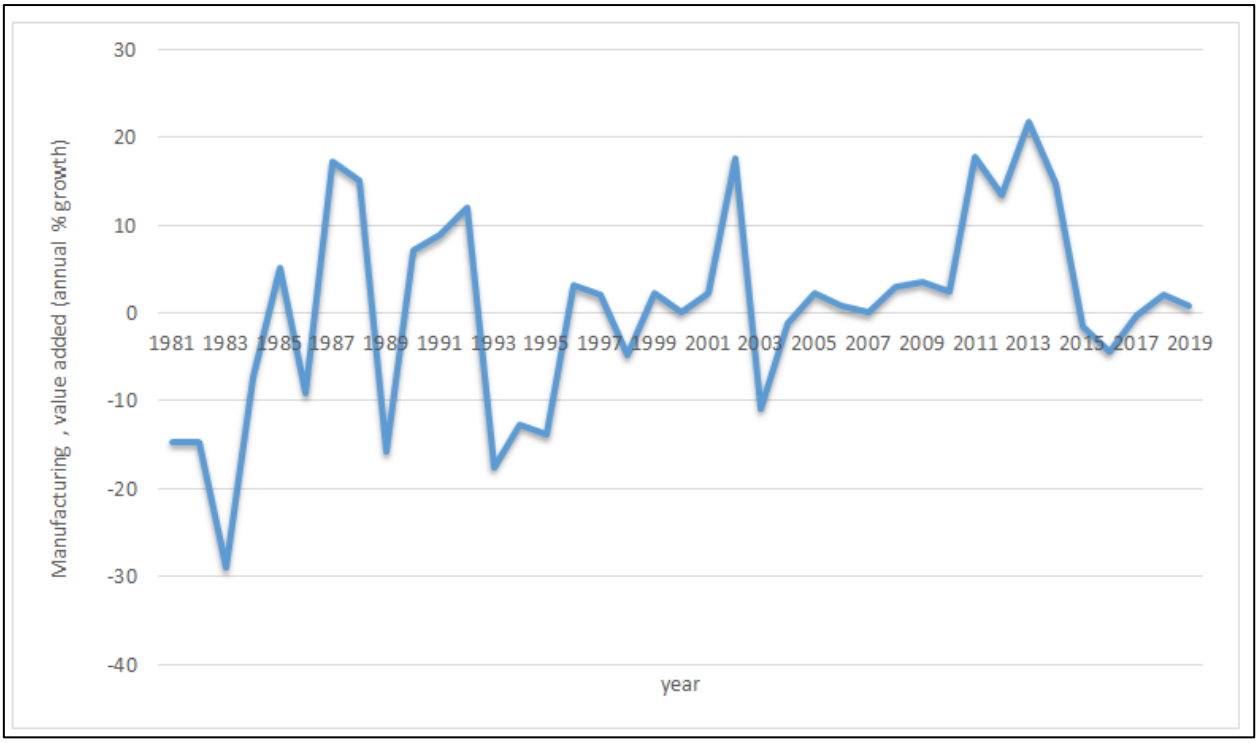
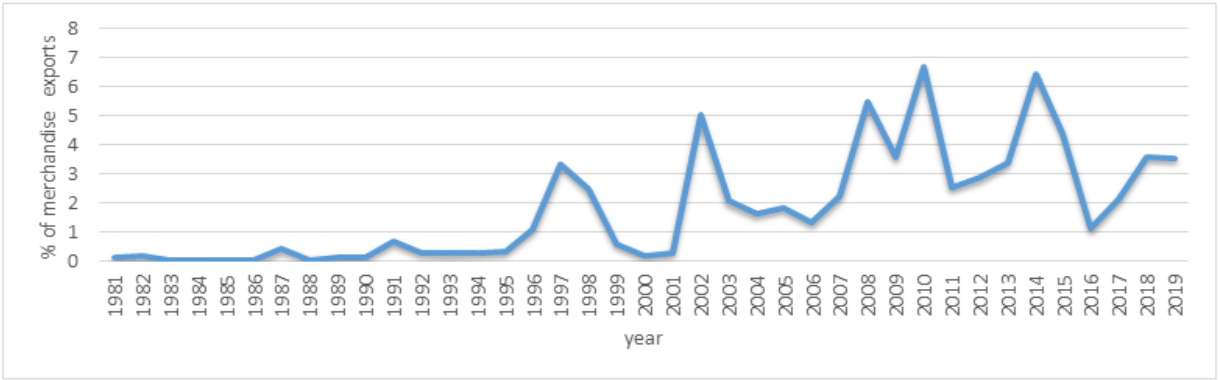


Fig 1: Manufacturing, value added (annual % growth) in Nigeria (1981-2019)
Source: World Development Indicators, 2021.

1.3 Nigeria's Manufacturing Exports of Total Merchandise Exports

The trend of export of manufactures as a percentage of total merchandise exports experienced significant fluctuations over the period 1981-2019 as shown in Fig. 2. Export of manufactures as a percentage of total merchandise exports stood at 0.13% in 1981 but steadily dropped to 0.03% in 1986 though rose to 0.15% in 1990. In 1991, it increased significantly recording 0.69% but again dropped by about 55.7% in 2001. From 2002 upward, manufactured export of as a percentage of total merchandise exports despite serious fluctuations has consistently been recording single digit. For instance, it fell from 5.01% in 2002 to 2.24% in 2007 though rose significantly to 5.5% in 2008. Again, it dropped to 3.6% in 2009. The fall during this period may be attributed specifically to 2008-2009 financial crisis and global economic meltdown. In 2010, the contribution of manufactured exports to merchandise exports rose to 6.7%. However, it considerably fell to 2.55% in 2011 although increased marginally to 3.39% in 2013. In 2014, it increased to 6.45% but fell to 4.39% in 2015 seemingly due to the economic recession. The fall during these periods spanned till 2017 when it recorded 2.16%. After overcoming the recession, the contribution of manufactured exports to merchandise exports rose to 3.6% in 2018 (66.7% increase higher than the contribution in 2019 with 64.2%). Generally, the contribution of manufacturing exports to total merchandise exports over these periods (1981-2019) averaged 1.83%. This low contribution, therefore, is a reflection of lack of international competitiveness of the Nigerian manufactured exports and low capacity utilization in the sector.

Panel A: Manufactures Exports (% of Merchandise Exports)



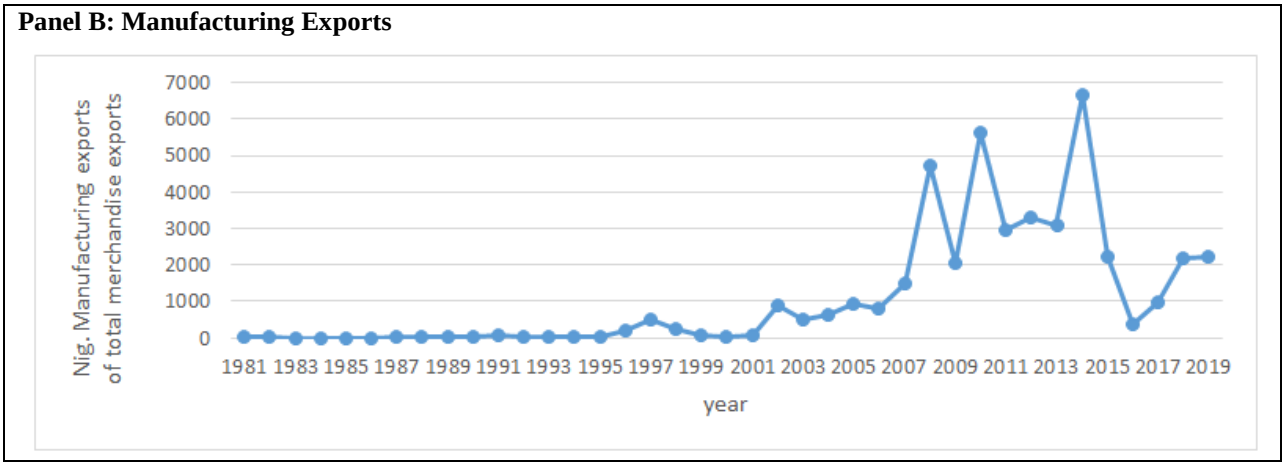


Fig 2: Nigeria's Manufacturing Exports of Total Merchandise Exports (1981-2019)
Source: Author's computation based on data extracted from UNCTADstat and WDI, 2021.

2. LITERATURE REVIEW

In the economic literature, exports determinants have been analyzed extensively considering either demand or supply side or both. This section gives an overview of empirical studies on the determinants of manufacturing exports across the developed, developing and cross countries. In the developed countries, Irwin (2001), for instance, determines the principal factors behind the incredible growth of U.S. manufactured exports, mainly focused on iron and steel industry. The author employed three-stage least squares (3SLS) and found that the origin of U.S. export success around the turn of the century directly linked to abundant of resource, thus resulted in lowering the price of basic material inputs which translate to domestic advantage. This is because those materials were not exported and indirectly, translating into higher elasticity of final goods supply which enabled greater share of the global market to be captured by U.S. exporters. For a sample of 75 countries, Kiendrebeogo (2012) found significant positive effect of financial development on manufacturing exports.

Bournakis (2012) used both price and non-price measures of competitiveness to analyze export performance of 18 Greek manufacturing industries. The results show high degree of responsiveness of Greek exports to price measure than any other determinants. Though, the results further show that as potential of industries increase towards providing differentiated products, price elasticity becomes smaller. Equally, non-price competitiveness, measured by technological stock is considered more important for high technology industries than for low-technology ones. While analyzing the determinants of manufacturing industry exports across 27 European Union member states, Sertić, Vučković and Perić (2015) employed system GMM estimator and found that domestic demand and industrial production significantly determine both total and high-tech manufacturing exports whereas only foreign demand determines total manufacturing exports.

While testing a range of manufacturing export determinants in Indonesia, van Dijk (2002) analysed export behaviour of 28 industries using both Tobit and Papke and Woolridge models (PW), which is designed to estimate fractional variables. The findings reveal that export behaviour in supplier dominated firms are determined by cost related factors and technology and, to a lesser degree, scale intensive firms. In a bilateral trade relation, Roberto *et al*. (2009) used fixed effect model to analyze the determinants of manufacturing exports to China from 79 trading partners. They found that countries with a larger human capital endowment could possibly export a larger volume of manufactures to China. Also, large countries with short geographical distance to China have tendency to export manufactures to it while other characteristics such as trade openness, endowment per worker of land or capital are insignificant determinants.

Using a total of 8486 Indian manufacturing firms sourced from the Prowess database (2009), Pradhan and Das (2012) found significant impact of both physical infrastructure (access to ports, power and telecommunications) and economic infrastructure (loan finance) on SMEs export activities. Also, conditions of local market (size, growth and per capita income of the host states) have positive effect on SME export activities. Yu and Hu (2015) test empirically the determinants of China's sophistication of manufactured exports across 29 countries. They authors controlled for heterogeneity using fixed and random effect models. Their findings show that upgrading both domestic and total sophistication of China's manufactured exports are significantly determined by improvement in R&D investment, financial development and factor structure. In a time series analysis, Akhtar *et al.* (2015) used ARDL estimator and found high possibility of improving Pakistan manufactured exports provided there is provision for conducive environment to attract FDI, investing in agriculture, value addition and acquaintance with the latest technology.

Across 32 states and 4 regions of Mexico, Cabral and Alvarado (2019) considered internal and external determinants using system GMM technique. Their findings generally reveal that percentage of manufacturing to total GDP is the most reliable determinant of manufacturing exports. Atif *et al.* (2019) estimate an augmented gravity model using Stochastic Frontier Analysis (SFA) in determining exports of Pakistan chemical products with its 62 trading partners. Their results show very high sensitive of chemical products' exports to tariff rates while devaluation of Pak. Rupee could improve chemical products' exports. In addition, colonial links, common language and Preferential Trade Agreements (PTA) were found to promote Pakistan chemical products' exports while political disputes hindered it. Using the same methodological approach, Bekele and Mersha (2019) with the aid of two-step GMM estimation technique found that lagged value of Ethiopia's coffee exports performance, GDP of both trading countries, Ethiopian population, institutional quality of Ethiopia, weighted distance and OPT of importing countries were found to be significant determinants of Ethiopia's coffee exports performance. Similar findings were reported by Dlamini *et al.* (2016) when analyzing the determinants of Swaziland's sugar export.

In another dimension, Hussain, Hussain, and Alam (2020) adopted (ARDL) bound testing approach and found that aggregate exports are highly elastic to production capacity and changes in prices, whereas they are inelastic to changes in production cost and pressure on domestic demand. For disaggregated exports, however, the result shows varied effects of supply-side factors across the subcategories of primary and manufactured exports. Sumiyati (2020), with the aid of the vector error correction model (VECM), explored the determinants of manufacturing exports in Indonesia between Q1 2010 and Q4 2019. The findings indicate that inflation and GDP are critical factors in developing policies to promote Indonesian manufactured product exports. Using a combination of fixed effect, tobit, and probit models, Zeleke (2020) investigated the determinants of manufacturing industry export performance at a firm level. He found that the use of a website, firm size, firm age, skill intensity, technology, export experience, and quality certification are the most important drivers of export performance. Using a similar approach, Francisco *et al.* (2022) found that the productivity of the company, the number of employees, and the lagged sales are the main determinants of footwear exports in a Portuguese Company.

In a panel analysis comprising 27 countries in Eastern Europe and the CIS between 1995 and 2018, Drapkin, Gainetdinova, and Panzabekova (2021) employed a fixed effect model to analyze the factors influencing the level of exports of high-tech industries. They submitted that the level of wages and resource prices, the economy's openness to foreign trade, the tax rate, the unemployment rate, and the quality of human capital are the factors stimulating export growth in high-tech industries. In a similar study, Zapata, Arrazola, and Hevia (2023) employed GMM and GLS estimation techniques to analyze the determinants of international trade flows of manufactured goods based on their technological content across 35 OECD countries between 2004 and 2018. They reported that gross fixed capital formation on total employment, the land area per capita, the percentage of university graduates relative to the population group, R&D expenditure in terms of GDP, stock of inward foreign direct investment in terms of GDP, imports of high-tech manufactures as a share of GDP, quality of national governance and regulation, country population, and EU membership are all determinants of technology-intensive exports.

In Sub-Saharan African (SSA), Grenier, McKay and Morrissey (1998) conducted a survey covering 83 manufacturing export firms in Tanzania. They found that the tendency of large firms to export is higher relative to other firms and that investment sustainability of more large firms is higher relative to smaller firms. In their findings, investment sustainability is considered a major determinant to export and that irrespective of size, firms with sustain investment have greater possibility of exporting than those without sustained investment. Across 354 magisterial districts in South Africa, Matthee and Naude (2008) employ range of estimators (Tobit, Random Effects-Tobit, and type II Tobit) found that the extent to which different regions in a developing country are expected to be successful in exporting manufactured products are influenced by internal distance, and thus domestic transport costs. Balchin *et al.* (2016) assess the current trends and future prospects of manufacturing in 9 SSA countries. They found that increasing production, employment, exports and FDI are significant determinants in SSA manufacturing sector. Mwiinga (2018) found that inflation and FDI as significant determinants Zambia's manufacturing sector in the long run.

3. THEORETICAL FRAMEWORK

The theoretical basis of this study is derived from centre-periphery models. The models was developed by Prebisch in 1950 and used by Okoh (2004). The models elucidate why some policies which retard the growth rate of African countries are found powerful in raising exports of industrialized countries. According to Prebisch model, two countries exist: the developed (centre) and the developing (periphery). Two commodities (manufactured and primary commodities) are produced. The centre produces and export manufactured products while the periphery produces and export primary products. The income elasticity of demand of the centre (Em) is greater than unity while that of the periphery (Ep) is less than unity. The starting rates of income growth of the two trading countries are assumed to be equal. Exports (x) and imports (m) growth rate (g) in the centre (c) and periphery (p) is given as:

(a) For the Centre;

$$C_x = P_g * Em \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$C_m = C_g * Ep \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

(b) For the Periphery;

$$P_x = C_g * Ep \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$$P_m = P_g * Em \quad \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where; C_x and P_x represent the export of the centre and periphery, C_m and P_m are the import of the centre and periphery. Export growth rate of the centre and periphery are represented by C_g and P_g, while income elasticity of demand for the centre and periphery are denoted by Em and Ep. The theoretical underpinning of equation (1) is that export of the centre depends on the quantity of raw materials imported from the developing countries and the responsiveness of the income of the centre's manufactured products. Equation (2) implies that import of the centre is determined by the proceeds realized by developed countries from manufactured exports and the low income associated with the export of primary products by the developing countries. The other way round explains the condition of the periphery, as shown in equations (3) and (4). Based on these explanations, countries on the periphery become worse-off at all levels as the price of raw materials and manufactured products are determined at both ends by the centre.

While Nigeria's imports as a developing countries is growing faster, there will be non-sustainability of such growth except that periphery can finance the ever growing BOP deficit on the current account by capital flows. Otherwise, maintaining the BOP equilibrium would require certain adjustments to reduce the imports growth and increase exports growth. Given this condition, the growth rate expected of the periphery towards maintaining the balance can be obtained. From the assumptions,

$$P_m = P_x \quad \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

$$P_x = P_g * Em \quad \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Hence;

$$P_g = \frac{P_x}{Em} \quad \ldots\ldots\ldots\ldots\ldots\ldots (7)$$

Equation (7) connotes that growth rate disparity between the centre and the periphery will be widened. Recall from equation (3) that while the periphery's export is given as: $P_x = C_g * Ep$, this therefore implies that the growth rate of its export can be written as:

$$P_g = C_g * \frac{Ep}{Em} \quad \ldots\ldots\ldots\ldots\ldots\ldots (8)$$

When equation (8) is divided by C_g, the implication is that the growth rate of the two countries (i.e., the centre and periphery) will be equivalent to the ratio of their income elasticity of demand:

$$\frac{P_g}{C_g} = \frac{Ep}{Em} \quad \ldots\ldots\ldots\ldots\ldots\ldots (9)$$

This condition will only hold if current account equilibrium on balance of payments (BOP) is a requirement and relative price adjustment to rectify BOP disequilibruim is ruled out (Thirwall, 1999).

3.1 Empirical Strategy

Export demand function can be specified in multiplicative form or constant elasticity function of foreign income and relative prices, as follows (Thirlwall, 1999; Okoh, 2004).

$$MEX_t = (RP_t)^{\beta} W_t^{1-\beta} \quad \ldots\ldots\ldots\ldots\ldots (10)$$

Where;

MEX_t = manufactured exports value in time t.

$(RP_t) = pd_t / pf_t$

RP_t = relative prices

Pf_t = the foreign price in time t.

Pd_t = the domestic price in time t.

W_t = The foreign income (Gross Domestic Product of the world) in time t.

β = The price elasticity of demand for exports (<0)

$1-\beta$ = The income elasticity of world demand for manufacturing exports (>0).

The model is expected to estimate the determinants of world demand for Nigeria's manufacturing exports. Also, the supply of manufacturing products is determined by its price and output. Equation (11) therefore could be expanded to incorporate other variables which are considered as the determinants of manufacturing export performance in Nigeria.

$$MEP_t = f(OPT_t, MVA_t, FDI/GDP, FIND, RP, W\_GDP) \quad \ldots\ldots\ldots\ldots\ldots (11)$$

Where;

MEP represents manufacturing export performance, RP is the relative price (the ratio of export price to domestic prices), FIND denotes financial development, W_GDP is the foreign income, FDI/GDP represents FDI as a percentage of GDP, OPT is trade openness, and MVA represents the manufacturing value added. Most of the variables included in the model were in line with World Trade Organization (WTO) convention in measuring international transactions.

In more explicit form, equation (11) in its static form can be rewritten based on the various indicators for measuring MEP as follows:

$$g\_mev_t = \delta_0 + \delta_1 opt_t + \delta_2 mva_t + \delta_3 fdi/gdp_t + \delta_4 find_t + \delta_5 rp_t + \delta_6 w\_gdp_t + \varepsilon_t \quad (12a)$$

$$mev/tev_t = \delta_0 + \delta_1 opt_t + \delta_2 mva_t + \delta_3 fdi/gdp_t + \delta_4 find_t + \delta_5 rp_t + \delta_6 w\_gdp_t + \varepsilon_t \quad (12b)$$

$$pemegdp_t = \delta_0 + \delta_1 opt_t + \delta_2 mva_t + \delta_3 fdi/gdp_t + \delta_4 find_t + \delta_5 rp_t + \delta_6 w\_gdp_t + \varepsilon_t \quad (12c)$$

Where;

g_mev_t = growth rate of manufactured exports value at time *t;* mev/tev_t = manufactured export as a percentage of total exports at time *t;* $pemegdp_t$ = percentage of manufacturing export in GDP at time *t*, and ε_t is the disturbance error term at time *t*.

The GMM estimator is preferably considered because it has ability to produce unbiased estimates even when the lag of dependent variables is used as instruments. Also, it has capability to avoid biased estimates which could be a consequence of correlation between the lagged endogenous variables and the error term. Moreover, with GMM, consistent parameter estimates can be obtained in the presence of measurement error as well as endogenous right-hand side variables in a system equation estimation procedure. Instrumental Variable (IV) estimation is often employed to deal with endogeneity issue. However, the IV estimation method is only useful provided the instruments have strong correlation with the potential endogenous variables, and must be genuinely exogenous to the model. Given this scenario, equation 12a, 12b and 12c may be explicitly specified in their dynamic form as follows:

$$g\_mev_t = \delta_0 + \delta_1 g\_mev_{t-1} + \delta_2 opt_t + \delta_3 mva_t + \delta_4 fdi/gdp_t + \delta_5 find_t + \delta_6 rp_t + \delta_7 w\_gdp_t + \varepsilon_t \quad \ldots\ldots (13a)$$

$$mev/tev_t = \delta_0 + \delta_1 mev/tev_{t-1} + \delta_2 opt_t + \delta_3 mva_t + \delta_4 fdi/gdp_t + \delta_5 find_t + \delta_6 rp_t + \delta_7 w\_gdp_t + \varepsilon_t \quad \ldots\ldots (13b)$$

$$pemegdp_t = \delta_0 + \delta_1 pemegdp_{t-1} + \delta_2 opt_t + \delta_3 mva_t + \delta_4 fdi/gdp_t + \delta_5 find_t + \delta_6 rp_t + \delta_7 w\_gdp_t + \varepsilon_t \quad \ldots\ldots\ldots (13c)$$

In order to ensure an unbiased and consistent estimates, all the variables in the model except the dependent variable are differenced.

3.2 Data and Measurement of variables

There are several indicators of manufacturing exports performance. Some of the indicators identified in the literature include: growth rate of manufactured exports (G_MEV), percentage of manufacturing export in GDP (PEMEGdp), manufactured export as percentage of total export (MEV/TEV) and real export growth of manufacturing sector. In this study, the first three indicators were considered. First, the growth rate of manufactured exports is not available in any of the data sources. However, the manufacturing export (% of total export) is multiplied by total merchandise export and divided by 100 to obtain the value of manufactured exports. Then the growth rate of this value was computed using elasticity approach. Second, manufactured export as percentage of total export was derived by dividing the value of manufactured exports computed by total export. Lastly, percentage of manufacturing export in GDP was derived by dividing the value of manufactured exports by GDP. The study utilizes annual time series dataset covering the period 1981 to 2019 for which data are available. Data for relative prices proxied by real effective exchange rate, FDI as a percentage of GDP, foreign income proxied by GDP of the World minus Nigeria's GDP were sourced from UNCTADstat database while data for financial development and openness to trade were sourced from CBN database. More so, manufacturing value added, manufacturing export (% of total export), total merchandise export and GDP were sourced from World Bank database. The definitions and measurements of all explanatory variables included in the model were demonstrated in Table 1.

Table 1: Variables Description and Measurements

Variables abbreviation	Variables explanation	Measurement/proxy	Expected signs	Data sources
MEP	Manufacturing exports performance			
RP	Relative prices	An index of real effective exchange rate (REER)- (2010=100)	-	UNCTAD
FIND	Financial Development	Credit to private sector	+	CBN
W_GDP	Foreign income	GDP of the World minus Nigeria's GDP	+	UNCTAD
FDI/GDP	FDI as a percentage of GDP	FDI as a percentage of GDP	+	UNCTAD
OPT	Openness to trade	(Export + import)/GDP	+	CBN
MVA	Manufacturing output	Manufacturing value added	+	WDI

Source: Author's compilation.

3.3 Estimation Issues and Procedures

The variables and estimation techniques were subjected to series of diagnostic tests to ensure that the results obtained are not misleading. The tests include endogeneity and validity of instruments. During the estimation process, two key econometric concerns arose: endogeneity and multicollinearity. Correlation analysis was used to determine the existence of multicollinearity among the explanatory variables. To avoid both multicollinearity and an insufficient degree of freedom caused by including too many variables in a single model, the model was divided into two (models 1 and 2). Endogeneity testing was carried out by estimating separate OLS for each partitioned model, from which the OLS residual was generated. Then, in each partitioned model, a Durbin-Wu test was performed to find the potentially endogenous variable(s). This is accomplished by correlating the OLS residual with each model's corresponding explanatory variables. In order to control for potential endogeneity problem, the GMM estimator was employed as it is considered more efficient and is generally found to be valid in cases of large samples. Finally, Hansen's J over-identification test with the null hypothesis of over-identifying restriction was employed to verify the validity of the instruments used to estimate the GMM.

4. EMPIRICAL ANALYSIS

4.1 Descriptive statistics

The average value of growth rate of manufactured exports (G_MEV), percentage of manufacturing export in GDP (PEMEGdp), and manufactured export as percentage of total export (MEV/TEV) stood at 9.68%, 29.33% and 1.83% (Table 2). More so, the mean value of OPT, R_MVA, FDI/GDP, RP, W_GDP and FIND are 0.30, 27.33, 18.45, 148.71, 50.51 and 5340.53, respectively for the period under consideration. Additionally, normality tests reported include: kurtosis, skewness and Jarque-Bera. For skewness test, which measures the asymmetry of the distribution of the series shows that G_MEV, MEV/TEV, PEMEGdp, R_MVA, GDI/GDP, FIND, RP and W_GDP are positively skewed as skewness statistics for each of these variables is greater than zero. However, OPT is negatively skewed as its skewness statistics is less than zero. The kurtosis statistics which measures the peakedness or flatness of the distribution of the series indicates that G_MEV, MEV/TEV, PEMEGdp, FIND and RP are highly leptokurtic since their kurtosis values are greater than 3. On the other hand, OPT, R_MVA, FDI/GDP and W_GDP are highly platykurtic as kurtosis statistics of each of them is less than 3. Finally, the Jarque-Bera test is statistically significant only for MEV/TEV, PEMEGdp, R_MVA, FIND, and RP. This implies that the null hypothesis of normality for these variables can be rejected.

Table 2: Descriptive Analysis

	Mean	Median	Max	Min	Std. Dev	Skewness	Kurtosis	Jarque-Bera	Observations
G_MEV	9.6850	6.31520	323.521	-216.942	111.601	0.5289	3.7524	2.7387	39
MEV/TEV	1.8259	1.13207	6.68577	0.02271	1.9097	0.9979	3.0488	6.4774**	39
PEMEGdp	29.3342	11.1149	145.090	0.10362	39.8369	1.75348	5.39719	29.3236***	39
OPT	0.3012	0.31140	0.58917	0.07362	0.1246	-0.0197	2.4192	0.5505	39
R_MVA	27.3336	23.7440	44.4731	19.2848	8.2630	1.0177	2.5324	7.0881**	39
FDI_GDP	18.4452	16.2272	37.8570	1.33004	10.7719	0.1549	2.1277	1.3924	39
FIND	5340.53	530.373	24922.9	8.57005	7994.58	1.2635	3.0581	10.3832***	39
RP	148.709	100.520	536.768	49.7329	118.585	1.8672	5.6640	34.1966***	39
W_GDP	50.5112	48.1336	83.9593	26.8660	17.3075	0.35903	1.8956	2.8197	39

Source: computed. Note: ***, ** and * imply significant at 1%, 5% and 10%, respectively.

Considering the three indicators of manufacturing exports performance mentioned above, this study conducted pairwise correlation analysis for each of the models. For instance, model 1 specifies the growth rate of manufacturing exports while models 2 and 3 model manufactured export as a percentage of total

exports and percentage of manufacturing export in GDP, respectively. The results show that the association between each of G_MEV, MEV/TEV and PEMEGdp and their respective explanatory variables are not strong enough to cause the problem of multicollinearity. However, the bivariate relationship among the explanatory variables in each of the models shows very high degree of correlation, especially between LFIND and LW_GDP (0.9928). This is an indication that the problem of multicollinearity exists in each of the models (see Table 3 for details).

Table 3: Pairwise Correlation Analysis

Growth rate of manufactured exports (g_mev)							
	g_mev	opt	lfind	lrp	lw_gdp	fdigdp	lr_mva
g_mev	1.0000						
opt	0.2404	1.0000					
lfind	0.0472	0.3612	1.0000				
lrp	-0.1661	-0.4408	-0.3727	1.0000			
lw_gdp	0.0618	0.3476	0.9928	-0.4072	1.0000		
fdigdp	0.1140	0.6825	0.3210	-0.3933	0.3244	1.0000	
lr_mva	-0.0998	-0.3854	0.4002	-0.0249	0.4222	-0.2993	1.0000
Manufactured export as a percentage of total exports (mev/tev)							
	Mev/tev	Opt	lfind	Lrp	w_gdp	fdigdp	r_mva
Mev/tev	1.0000						
Opt	0.2449	1.0000					
lfind	0.7502	0.3612	1.0000				
lrp	-0.1438	-0.4408	-0.3727	1.0000			
lw_gdp	0.7209	0.3476	0.9928	-0.4072	1.0000		
Fdigdp	0.1190	0.6825	0.3210	-0.3933	0.3244	1.0000	
lr_mva	0.3077	-0.3854	0.4002	-0.0249	0.4222	-0.2993	1.0000
percentage of manufacturing export in GDP (pemegdp)							
	pemegdp	opt	lfind	lrp	w_gdp	fdigdp	r_mva
Pemegdp	1.0000						
Opt	0.2492	1.0000					
lfind	0.6782	0.3612	1.0000				
lrp	-0.1426	-0.4408	-0.3727	1.0000			
lw_gdp	0.6365	0.3476	0.9928	-0.4072	1.0000		
Fdigdp	-0.0775	0.6825	0.3210	-0.3933	0.3244	1.0000	
lr_mva	0.2404	-0.3854	0.4002	-0.0249	0.4222	-0.2993	1.0000

Source: Author's computation.

4.2 RESULTS AND DISCUSSION

Starting with the main measure of manufacturing exports performance (i.e., growth rate of manufactured exports (G_MEV)), the dynamic model estimation results in columns 1 and 2 of Table 4 reveal that among the significant explanatory variables in the model, the lag of dependent variable and relative prices (RP) are inconsistent with the expected signs. However, foreign income proxied by world GDP ((W_GDP) in column 2 is not statistically significant.

From the estimated results in columns 1 and 2 of Table 4, the lag of dependent variable is statistically significant with negative algebraic signs in both models. This could be interpreted to mean the current growth rate of Nigeria's manufactured exports could be greatly impaired due to the low growth rate of manufactured export recorded in the previous periods. The estimated results show that the degree of trade openness which connotes a substantial reduction in tariff and non-tariff barriers is found to be an important driver of Nigeria's manufactured exports. As shown by the estimates in columns 1 and 2, significant positive coefficients of openness to trade (OPT) could signify the removal of trade distortions in the economy. This increases trade gains such that capital goods required by the export sector, in particular, the manufactured would be available. Further, the estimates suggest that an improvement in the degree of trade openness has tendency to boost the performance of Nigeria's manufactured exports by about 4.4% and 4.0% as shown in models 1 and 2. This result is consistent with the studies by Dlamini *et al.* (2016) and Bekele and Mersha (2019) who conclude that exporting countries and their trading partners should encourage policies that eliminate trade barriers while promoting policies that lead to the exceptional advancement of their economies.

The GMM results in columns 1 and 2 of Table 4 show a significant positive impact of manufacturing value added (MVA) on manufacturing exports. This implies that the ability of a country to transit from exporting primary products to processed manufactured goods with the adoption of sound technological innovation has a tendency to stimulate the growth of its manufacturing exports. The estimates further show that the growth rate of Nigeria's manufacturing exports could be increased by 6.3% and 7.2% provided its level of industrialization is improved. The findings indicate that

the coefficients of FDI as a percentage of GDP (FDI/GDP) in columns 1 and 2 are found to be positive and statistically significant at 5% level of significance. This indicates that FDI is crucial for increasing the growth rate of Nigeria's manufactured exports, particularly when it is invested in the right sectors. These results are in line with the findings of Akhtar *et al.* (2015) and Cabral and Alvarado (2019). The former found that positive effects of FDI in the host country lead to an increase in exports while the latter found long-term effects of FDI on the exporting manufacturing sector across the regions.

Full realization of a country's export potential is mainly driven by its access to financial services which could enhance the level of innovation in the manufacturing sector, paving way for investors to take advantage of the newly created opportunities. Therefore, a country with higher level of financial development experienced higher levels of manufacturing exports. This is supported by the significant positive coefficient of financial development in column 1, which shows that the growth rate of Nigeria's manufactured exports could be stimulated provided the financial systems in operation is well-developed. This result also corroborates the findings of Kiendrebeogo (2012) and Yu and Hu (2015). The former found that countries with well-functioning financial systems experience higher levels of manufacturing exports while the latter found that improvement in financial development will play a pivotal role in upgrading both domestic and total sophistication of China's manufactured exports. A rise in RP indicates currency appreciation, which is associated with higher trade costs. The appreciation of Nigeria's currency makes exporting manufactured goods more expensive and uncompetitive. As a result, its demand in international markets falls as the purchase power of trading partners' currencies falls. This contradicts the estimated results of the two models in columns 1 and 2, which show a strong positive RP coefficient. According to the estimations, a 1% increase in the value of the Naira raises the growth rate of Nigeria's manufactured exports by 0.76% and 0.84%. However, this violates the theory. This could be explained by the fact that some developing African countries with a weak manufacturing sector prefer Nigeria manufactured goods. Therefore, the demand from these countries could possibly not respond negatively to appreciation of Nigeria's currency

Table 4: Results of the dynamic models of the determinants of manufacturing exports performance

Estimation Method	**GMM estimates**					
Dependent variable	**Growth rate of manufactured exports**		**Manufactured export as a percentage of total exports**		**percentage of manufacturing export in GDP**	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
G_MEV_lag1	-0.339 (-2.61)***	-0.317 (-2.06)**				
MEV/TEV_lag1			0.540 (7.17)***	0.539 (6.88)***		
PEMEGdp_lag1					0.057 (10.39)***	0.438 (5.03)***
D_OPT	4.444 (2.95)***	3.991 (3.19)***	-0.735 (-2.31)**	-0.709 (-2.11)**	0.740 (0.43)	0.718 (0.47)
D_LR_MVA	6.321 (4.99)***	7.173 (6.39)***	4.231 (6.17)***	4.281 (5.68)***	7.729 (5.18)***	12.706 (4.05)***
D_FDI/GDP	0.065 (1.98)**	0.082 (2.40)**	-0.099 (-3.64)***	-0.109 (-2.94)***	-0.285 (-4.51)***	-0.203 (-2.79)***
D_LFIND	1.112 (2.79)***		0.009 (0.01)		3.753 (2.58)**	
D_LRP	0.761 (2.02)**	0.843 (2.68)***	0.843 (4.80)***	0.854 (4.66)***	1.146 (4.33)***	1.739 (4.00)***
D_LW_GDP		13.469 (1.33)		-5.021 (-0.59)		-0.981 (-0.04)
Constant	-0.172 (-1.27)	-0.353 (-0.89)	0.859 (4.22)***	1.034 (3.12)***	0.555 (1.46)	1.762 (2.16)**
Over identification test (p-value)	10.951 (0.5331)	11.186 (0.5952)	17.805 (0.4012)	18.184 (0.3132)	27.532 (0.2803)	14.184 (0.3610)
No of observations	37	37	38	38	37	38
R-square	0.325	0.258	0.517	0.524	0.511	0.471
Wald chi2(6)	52.11 (0.0000)	67.52 (0.0000)	383.10 (0.0000)	342.62 (0.0000)	872.76 (0.0000)	116.42 (0.0000)
Endogenity test GMM C statistic chi2(1)	3.53815 (0.0600)	3.79988 (0.0513)	3.88293 (0.0488)	3.27675 (0.0703)	3.586 (0.0583)	5.3404 (0.0208)

Source: Author's computation.

Note: z-test are in parentheses while ***, **, and * represent p<0.01, p<0.05, and p<0.1.

To ensure robustness of the results, this study also considered other two measures (i.e., manufactured export as a percentage of total exports (MEV/TEV) and percentage of manufacturing export in GDP (PEMEGdp)). When manufactured export as a percentage of total exports (MEV/TEV) is considered as a measure of manufacturing export performance (MEP), the estimated results in columns 3 and 4 of Table 4 reveal that all the explanatory variables are significant except financial development for model 1 and W_GDP for model 2. However, openness to trade, FDI as a percentage of GDP and relative prices do not follow their expected signs. For both models 1 and 2 (in columns 3 and 4), the GMM estimates reveal that the lag value of MEV/TEV_lag1 has a significant positive impact in explaining the current ratio of manufactured export to total exports. This connotes that a larger proportion of currently manufactured goods exported in Nigeria could possibly be stimulated if there is an improvement in the ratio of manufacturing exports to total exports during the erstwhile period. Both in columns 3 and 4, significant negative coefficients of OPT for models 1 and 2 are not theoretically supported. The argument could be based on the belief that liberalization policy may be injurious to the prospect of achieving a strong industrial base and a larger proportion of manufactured goods being exported to the world. With this policy, therefore, a developing country like Nigeria where its manufacturing sector base is weak may be fear of competition that may be posed by the imported products which might not only be in terms of cheaper price but also with better quality.

MVA reported significant positive coefficients both in columns 3 and 4. These estimates also buttress the earlier discussion of this variable in columns 1 and 2 when manufacturing exports performance is measured by the growth rate of manufactured exports. With respect to FDI/GDP as a determinant of MEP, the two estimates in column 3 and 4 show significant negative coefficients and this is inconsistence with the theory. The main argument could either be that the proportion of FDI attracted to Nigeria's manufacturing sector is insignificant or that FDI attracted to the manufacturing sector in Nigeria is predominantly oriented towards serving the domestic rather than export market. This result is related to the findings of Cabral and Alvarado (2019), who found similar long-term effects of FDI on the exporting manufacturing sector across most of the regions except the Central region in Mexico. Similar to earlier discussion, significant positive coefficients of RP shown for the two models in column 3 and 4 are inconsistence with the theory. Thus, it is an indication of fall in purchasing power of trading partners' currencies and it is expected to reduce the percentage of manufactured goods being exported.

The two models in columns 5 and 6 of Table 4 reflect the estimates when percentage of manufacturing export in GDP (PEMEGdp) is considered a measure of manufacturing exports performance. The results indicate that all the explanatory variables are significant with the exception of OPT in the two models whereas only W_GDP in model 2. The sign of both FDI/GDP and RP are inconsistence with the theory. From the estimates, it is observed that the lag value of dependent variable in the two models is an important driver in explaining the current percentage of manufacturing export in GDP. Similarly, the two models in column 5 and 6 show MVA to have a significant positive impact. From the overall results, it is clearly shown that MVA is consistence under the three indicators. This implies that MVA is considered a key driver of Nigeria's manufacturing exports performance considering the three indicators used for measuring manufacturing exports performance in this study. In the same vein, FDI shows a significant negative impact under the two models in columns 5 and 6. As expected, financial development in Model 1 column 5 is positively signed and statistically significant at 5%. The result shows that a 1% increase in financial development will lead to about 3.8% increase in proportion of manufacturing export in GDP. The coefficients of relative prices under the two models in columns 5 and 6 show a significant positive impact. Finally, foreign income measured by world GDP in columns 4 and 6 is wrongly signed and statistically insignificant. This clearly points to the fact that Nigerian manufactured goods may be regarded as inferior and failing to satisfy global market standards. By implication, as the income of the world economy is increasing, the demand for high quality products tends to rise.

5. CONCLUSION AND POLICY RECOMMENDATIONS

It is evident from the analysis that improvement in the degree of trade openness, increasing MVA, access to financial services and increasing investment level through FDI had a tendency to enhance manufacturing export performance in Nigeria. Although relative prices measured by real effective exchange rate is a key driver but wrongly signed to imply an appreciation of Nigeria's currency. This could make manufactured goods exported more costly and uncompetitive and thus reduce their demand in foreign markets since it reduces the purchasing power of trading partners. Finally, foreign income measured by world GDP is not a key driver for Nigeria's manufacturing exports. In terms of policy implications, the study suggests that the government, through its relevant agencies such as the CBN, NEXIM, and SMEDAN, provide adequate finance, increase credit allocation, and implement policies aimed at promoting financial services accessibility in order to ensure efficient distribution to the preferred sector. Furthermore, while trade gains associated with trade liberalization increase, trade restrictions reduce such gains. As a result, it is critical that the Nigerian government, through the Federal Ministry of Industry, Trade and Investment (FMITI), implement policies that eliminate trade barriers while also promoting policies that lead to the country's exceptional advancement.

Given the crucial role of FDI inflows into the economy, the CBN should not only develop policies to encourage foreign investors into the manufacturing sector, but also implement additional measures such as ease of doing business and other bottlenecks relating to investment promotion into the sector. Finally, the Nigerian government, through its Ports Authority and other allied agencies, should step up its efforts to transit from a primary product exporter and import-dependent country to a more industrialized economy through process upgrading. This could be achieved through accumulation of sound technological innovation and learning capabilities, which is not an automatic process, but rather how to use and adapt it to local conditions. To aid these, the government, through the FMITI should implement an import substitution strategy.

Limitations of the study

This study has limitations as some determinants, such as research and development (R&D) expenditure, among others, were not included in the analysis. Also, the time length of this study is limited to 2019 due to lack of data.

Suggestions for Future Research

Future studies are required to further explore the determinants of manufacturing export performance. Such studies could broaden the scope of this study. This study's focus is limited to Nigeria from 1981 to 2019. Future studies could investigate the determinants of manufacturing export performance while including more countries. In addition, other methodologies can be used apart from the GMM adopted for this study.

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