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Impact of Global Factors on Manufacturing Output Growth in Sub-Saharan Africa

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Abstract

This study examined the impact of global factors on manufacturing output growth in Sub-Saharan Africa. The study used annual panel data of forty (40) Sub-Sahara African countries from 1981 to 2019, constituting 38 observations for each country. The study employed secondary data obtained from World Bank's World Development Indicators. The dynamic panel autoregressive distributed lag (PARDL) model was used through the pooled mean group (PMG), mean group (MG) and dynamic fixed effects (DFE) estimators. The findings of the study revealed that the only global factor that have significant impact on manufacturing output growth in Sub-Saharan Africa was foreign direct investment, which has a positive impact. The study concluded that, the inflow of foreign investment is vital to boosting manufacturing output in SSA countries. It therefore, recommended that policymakers in these countries should make efforts to attract further inflows of foreign capitals by ensuring a stable and business friendly economic environment through their macroeconomic policies of maintaining a low level of inflation and developing business-enhancing infrastructures.

Keywords: Global Factors, Manufacturing, Growth, Sub-Saharan Africa
JEL Classification: F43

1. Introduction

The relevance of the manufacturing sector to economic growth and development has been documented in several scholarly works in the literature (Ekienabor *et al.*, 2016; Ejaz, Ullah & Khan, 2017; Sankaran, Vadivel & Abdul Jamal, 2020). This argument was based on its capacity to foster wide and efficient backward and forward linkages among other sectors of the economy (Kenny, 2019). It is therefore very vital to understand the determinants of manufacturing activities. While the impacts of some internal macroeconomic factors have been examined on manufacturing output growth (see, Dornbusch & Fischer, 1980; Szirmai, 2009), the impacts of other external factors that relate to the global economy need to be examined on the domestic manufacturing output growth, particularly, in Sub-Saharan Africa, where the performance of manufacturing sector is poor relative to those in other regions of the world (Kenny, 2019).

Despite the focus on internal macroeconomic control for a long time and the increasing attention given by policymakers to ensure a stable macroeconomic output, the manufacturing sector output is still recorded low. For instance, estimates from the World Bank World Development Indicators (2021) indicate that manufacturing value added to GDP was 12.6 per cent in the year 2000, which fell to 11.3 per cent in 2005, fell further to 9.8 per cent in 2010, increased slightly to 10.3 per cent in 2015 and further increased very slightly to 10.9 per cent in 2019. This simply indicates that the various adjustment reforms instituted by policymakers of countries of the region to address the internal macroeconomic factors have not fully transform their manufacturing sector (Bhorat *et al.* 2017). This necessitate the need to shift attention toward other factors that might be into play in determining the manufacturing sector performance aside the internal macroeconomic factors. These factors include those determined by the global economy, such as the foreign direct investment, global commodity prices and international oil prices. These factors are totally beyond the influence of the domestic economy (Kenny, 2019). However, policy action could be directed to attract the benefits from these global factors and hedge against their negative influence.

Given the perceived influence of these global factors on the performance of manufacturing sector of an economy, it is important for policy maker of countries in Sub-Saharan Africa to pay attention to them in order to achieve a better performance of the manufacturing sectors of their respective economies. Thus, the study aims to examine the impact of global factors like, foreign direct investment, international oil prices and global commodity prices on manufacturing output in Sub-Saharan Africa. The rest of the paper is organized as follows. Section two discusses the review of literature from the theoretical and empirical perspectives; Section three discusses the methodology and results of the study while Section four presents the concluding remarks.

2. Literature Review

The neoclassical growth model created by Solow and Swan (1956) provides the theoretical foundation for the investigation of industrial outputs. Despite the fact that the model was created to explain overall economic growth, its relevance to the production of a sub-sector of the entire economy has been largely recognized (Kenny, 2019). Economic growth, according to the theory, is the consequence of three factors: labour, capital, and technological progress. While an economy's capital and labour resources are restricted, technology's contribution to growth is limitless. Short-term equilibrium is said to be the result of varying amounts of labour and capital in the production function. The idea also contends that technical advancements have a significant impact on an economy, and that economic growth cannot be sustained without them. Overall, neoclassical growth theory suggests that long-term output growth is primarily determined by population expansion and technical advancement. The incorporation of capital stock and labor growth, as well as technical advancement, into the growth model was made possible by this theoretical postulation. Because the research is focused on a group of developing countries (i.e., Sub-Saharan Africa), technology is defined as that which is received through trade and economic activity. Since this study is on manufacturing output growth, the fundamental variables are also included while the external global factors are included with lessons taken from the empirical literature.

Among the studies that examined the impact of some global factors on manufacturing or industrial output performance is the work by Zhao and Zhang (2010) in their study FDI and Industrial productivity in China investigated that how FDI had an impact on the China's industrial productivity in the panel data analysis of five years from 2001-2006. The study employed the OLS regression methodology with dependent variable measured as current value added of an industry. The independent variables considered were total number of employees, domestic capital formulation, human capital, technological efforts, direct effects of FDI and indirect of FDI. Rasheed (2010) investigated the productivity in the Nigerian manufacturing subsector using co-integration and an error correction model. The study indicates the presence of a long-run equilibrium relationship index for manufacturing production, determinants of productivity, economic growth, interest rate spread, bank credit to the manufacturing subsector, inflation rates, foreign direct investment, exchange rate and quantity of graduate employment. This finding has research gap on the area of factors that affect manufacturing sector in Nigeria. Hence, with the non-availability of previous work that gives a clear-cut relationship between the macro-economic variables and industrial development, undertaken this research work becomes necessary and imperative.

Odior, (2013) empirically investigated the impact of macroeconomic factors on manufacturing productivity in Nigeria over the period 1975-2011. He started his analysis by examining stochastic characteristics of each time series by testing their stationarity using Augmented Dickey Fuller (ADF) test and estimate error correction mechanism model. His result revealed the presence of a long-term equilibrium relationship, as evidenced by the cointegrating equation of the VECM and concludes that credit to the manufacturing sector in the form of loans and advances and foreign direct investment have the capacity to sharply increase the level of manufacturing productivity in Nigeria, while broad money supply has less impact. Aiyedogbon and Anyanwu (2015) examined the impact of macroeconomic determinants on industrial productivity in Nigeria for the period, 1981-2013. The macroeconomic variables in the study include industrial production index, exchange rate, consumer price index, interest rate, broad money supply, foreign direct investment, credit to manufacturing sector and gross domestic product. The study employed OLS technique and found that exchange rate exerts significant positive impact on industrial productivity in Nigeria. Also, the impact of interest rate, FDI and real GDP on industrial production index is positive. On the other hand, consumer price index, broad money supply and credit to manufacturing sector exert negative impact on industrial development in Nigeria. The study recommended that a workable M2 that can enhance credit to manufacturing sector and at the same time control interest rate to boast investment should be determined. Ajudua and Ojima (2016) examined the determinants of output in the Nigerian manufacturing sector from 1986 – 2014. Gross Capital Formation, Bank Credit to Manufacturing Sector, Lending Rate, Employed labour Force, Foreign Direct Investment, Manufacturing Capacity Utilisation Rate, and Foreign Exchange Rate were used as explanatory variables and were regressed on manufacturing sector output (dependent variable). The Unit root test using the Augmented Dickey Fuller test was conducted to test for stationarity among variables. The Johansen Co-integration test was also employed to test for long run equilibrium relationship among the variables; the Granger Causality test was conducted so as to ascertain the causal relationship between variables while the stability test was also conducted to check for the long run stability of the variables employed. The study found a significant relationship between the explanatory variables employed and the output of the manufacturing sector in Nigeria during the

period studied. It was recommended based on findings that there is a need for infrastructural development, importation of goods should be discontinued, consumption of local goods encouraged, agricultural production encouraged as a source of raw material for the industries and low lending rate to the manufacturing sector should be implemented.

Ekienabor *et al.* (2016) investigated the effect of foreign direct investment (FDI) on the manufacturing sector in Nigeria, and its importance in the Nigeria economy in general. The econometric regression model of ordinary least square was applied in evaluating the relationship between FDI and major economic indicators such as manufacturing output, exchange rate and interest rate. The model revealed a positive relationship between foreign direct investment and each of the variables (manufacturing output, exchange rate and interest rate). FDI has a positive relationship on the manufacturing sector in Nigeria. In addition, there is a positive and significant relationship between Exchange rate (EXCH) and manufacturing output in Nigeria. Onodje and Farayibi (2020) examined the determinants of manufacturing sector growth in Nigeria from 1980-2018 with the aid of dynamic ordinary least square (DOLS) method of econometric analysis which has the potential to generate reliable estimates than the static OLS. In particular, DOLS accounts for endogeneity problem by adding leads and lags. Results of the study indicate that the main determinants of Nigeria's manufacturing growth are foreign direct investment (FDI), interest rate, labour force, inflation and exchange rate. The study recommended that a robust regulation of foreign capital importation and local content policies to stem capital flight and spur manufacturing growth in the country. Also, that the interest rate regime should be made to favour domestic capital utilization. This should involve laying emphasis on single-digit interest rate in order to lower the cost of production and boost activities in the manufacturing sector. The review of empirical literature revealed that few studies have been conducted to examine at least, a factor among the global factors that can affect manufacturing output growth. the only variable given focus in the literature is foreign direct investment. Therefore, this study is conducted to fill this void by examining the impact of foreign direct investment, international oil prices and global commodity prices on manufacturing output in SSA countries.

3. Methodology

This study adopted *ex-post facto* research design and this is because investigation started after the fact has occurred without interference from the researcher and also for the fact that data needed for the study already exists. The secondary data from many panel units that were used in this study were sourced from World Bank's World Development Indicators (WDI) over a period of thirty-nine (39) years from 1981 to 2019. The population of this study is the whole of Sub-Saharan African countries which consists of 49 countries. However, due to constraints in obtaining the data, a convenience sampling was employed to arrive at a sample of forty (40) Sub-Sahara African countries for which secondary data are consistently available. Excluded countries due to lack of readily available data are Central African Republic, Djibouti, Eritrea, Madagascar, Sao Tome and Principe, Somalia, South Sudan, Sudan and Chad.

Following the theoretical foundation provided in the neoclassical growth model, as well as modifying the industrial output model specified by Ejaz *et al.* (2017), the empirical model of this study is given as follows.

$$\Delta logMO_{it} = \beta_0 + \beta_1 PG_{it} + \beta_2 CAP_{it} + \beta_3 FDI_{\mathrm{it}} + \beta_4 GCP_{it} + \beta_5 OP_{it} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots 1$$

Where: $\Delta logMO$ is the annual growth of manufacturing value-added; PG is population growth; CAP is capital formation; FDI is foreign direct investment; GCP is global commodity prices; OP is international oil prices. $\beta_0 - \beta_5$ are the parameters to be estimated; ε is the disturbance term; i subscript indicates observation over different Sub-Sahara African countries; and t subscript indicates observation over different time periods.

Both the Descriptive and Inferential statistics were employed in this study. The descriptive entails presenting the summary statistics while the inferential entails presenting the results from the regression analysis to examine the impact of global factors on manufacturing output growth. Prior to the regression results, unit root and cointegration tests' results were also presented as necessary pre-estimation tests. More specifically, the dynamic fixed effects estimator of the ARDL regression was employed in this study.

4. Results

Descriptive Analysis

Table 1: Results of Summary Descriptive Statistics of Variables

Variable	Mean	Standard Deviation	Min	Max
ΔlogMO (in %)	5.22	21.12	-37.93	375.16
PG (in %)	2.59	1.11	-6.77	8.12
CAP (in %)	22.05	11.45	-2.42	89.38
FDI (in %)	3.33	8.43	-28.62	161.82
OP (in US$)	41.98	30.88	12.78	111.65
GCP (basket of goods)	85.12	43.04	47.31	182.47

Note: ΔlogMO is growth of manufacturing output; PG is population growth; CAP is capital formation; FDI is foreign direct investment; OP is Brent crude oil prices; and GCP is global commodity prices.
Source: Author's Computation

The descriptive analysis presented here are those from the summary statistics results presented in form of mean, standard deviation, minimum and maximum values. As seen from Table 2, manufacturing output growth has a mean of 5.22, standard deviation of 21.12, minimum of -37.93 and maximum of 375.16. Population growth has a mean of 2.59, standard deviation of 1.11, minimum of -6.77 and maximum of 8.12. Capital formation share of GDP has a mean of 22.05, standard deviation of 11.45, minimum of -2.42 and maximum of 89.38. Foreign direct investment share of GDP has a mean of 3.33, standard deviation of 8.43, minimum of -28.62 and maximum of 161.82.

Table 2: Pairwise Correlation Analysis Results

Variable	ΔlogMO	PG	CAP	FDI	OP	GCP
ΔlogMO	1.00					
PG	0.19	1.00				
	(0.000)					
CAP	0.23	-0.02	1.00			
	(0.000)	(0.500)				
FDI	0.26	0.04	0.26	1.00		
	(0.000)	(0.100)	(0.000)			
OP	0.01	-0.05	0.13	0.18	1.00	
	(0.740)	(0.050)	(0.000)	(0.000)		
GCP	0.01	-0.05	0.14	0.18	0.69	1.00
	(0.840)	(0.040)	(0.000)	(0.000)	(0.000)	

Note: p-values in parenthesis; ΔlogMO is growth of manufacturing output; PG is population growth; CAP is capital formation; FDI is foreign direct investment; OP is Brent crude oil prices; and GCP is global commodity prices.
Source: Author's Computation

Crude oil prices have a mean of 41.98, standard deviation of 30.88, minimum of 12.78 and maximum of 111.65. Global commodity prices have a mean of 85.12, standard deviation of 43.04, minimum of 47.31 and maximum of 182.47. Table 2 presents the results of pairwise correlation analysis to examine the relationship that exists among variables and verify if the relationships do not have too high correlation coefficients that can cause problem of multicollinearity. The results revealed that the correlation coefficients of the relationships are quite lower than the threshold of 0.8. Therefore, there is no problem of severe multicollinearity in the models of this study.

Unit Root Test

Table 3: Results of Unit Root Test of Variables

Variable	z-statistic	p-value	Order of Integration	Stationarity
ΔlogMO	-45.5	0.000	I(0)	Stationary
PG	-4.90	0.000	I(0)	Stationary
CAP	-10.04	0.000	I(0)	Stationary
FDI	-33.2	0.000	I(0)	Stationary
OP	-1.42	0.077	-	Not Stationary at I(0)
D(OP)	-66.7	0.000	I(1)	Stationary
GCP	0.248	0.598	-	Not Stationary at I(0)
D(GCP)	-71.7	0.000	I(1)	Stationary

Source: Author's Computation

Table 3 presents the results of unit root test conducted for each of the variables employed in the models of this study to verify their stationarity and order of integration if they are non-stationary. Employing the Harris-Travalis panel unit root procedure, the results revealed that all variables except oil prices and global commodity prices are stationary at level series and are I(0) variables. This is because they have statistics that are high with low p-values thereby rejecting the test's null hypothesis of non-stationarity. As for other variables, i.e., oil prices and global commodity prices, which are not stationary at their level series, the test was conducted for them at their first-difference series and they appeared to be stationary, making them I(1) variables.

This means that there is a combination of I(0) and I(1) variables employed in the models of this study. This leads to the appropriateness of a dynamic ARDL model, which is done through the dynamic fixed effects estimation. Prior to the estimation, the fact that some variables are not stationary at level (i.e. are not I(0)) necessitate a cointegration test which was conducted and presented in Table 4.

Table 4: Cointegration Test Results

Model	z-statistic Value	p-value
Manufacturing Output Growth	-8.064	0.000

Source: Author's Computation

The results presented in Table 4 shows that manufacturing output growth model has a statistic value of -8.064 and corresponding p-value of 0.000, which suggests that the statistic is significant. Given that the null hypothesis of the cointegration test states that there is no long-run linear cointegration, the significant statistic indicates that this null hypothesis is rejected and hence, it is concluded that the variables of the manufacturing

output growth model are cointegrated and have long-run relationship. These pre-estimation tests imply that the models of this study can be estimated without encountering any problem of spurious regression result. Therefore, the dynamic fixed effects estimation was conducted for the model and reported in Table 5.

Table 5: Dynamic Fixed Effects Regression Results for Manufacturing Output Growth

Variable	Coefficient	Std. Error	z	p-value
	Long-Run Estimates			
PG	0.798	0.587	1.36	0.174
CAP	0.030	0.077	0.40	0.690
FDI	0.174**	0.086	2.02	0.044
OP	0.157	0.163	0.96	0.337
GCP	-0.113	0.117	-0.97	0.334
	Short-Run Estimates			
Δ(ΔlogMO)(-1)	0.832***	0.029	28.2	0.000
ΔPG	0.056	0.978	0.06	0.954
ΔCAP	-0.124	0.095	-1.3	0.193
ΔFDI	0.066	0.096	0.69	0.491
ΔOP	0.262	0.167	1.57	0.117
ΔGCP	-0.219	0.133	-1.64	0.102
Constant	0.299	3.810	0.08	0.937
Cross Sectional Dependence test	1.519			0.168

Note: *** indicates significance at 1%; *** indicates significance at 5%; * indicates significance at 10%; ΔlogMO *is growth of manufacturing output; PG is population growth; CAP is capital formation; FDI is foreign direct investment; OP is Brent crude oil prices; GCP is global commodity prices; (-1) signifies first period lag; and Δ signifies first difference.*
Source: Author's Computation

In Table 5, both the short and long run estimates are presented for the effect of external (global) factors on manufacturing output growth. The long run estimates are presented in the upper part of the table while the short run estimates are presented in the lower part of the table. From the long run estimates, the result shows that foreign direct investment has a positive estimate that is statistically significant, which is 0.174, with a p-value of 0.044. This signifies that foreign direct investment has a long-run positive effect on manufacturing output growth of SSA countries. All other variables have estimates that are not statistically significant in the long-run regression result, judging from their p-values which are greater than the highest conventional significance level of 10% (i.e. 0.1). This signifies that they do not have significant long-run effect on manufacturing output growth of SSA countries. The significant positive estimate of foreign direct investment signifies that a per cent point increase in the share of foreign direct investment in GDP will lead to a long-run rise in manufacturing output growth of SSA countries by 0.174 per cent points and vice versa.

From the short-run estimates, foreign direct investment has an estimate that is statistically insignificant. This signifies that foreign direct investment does not have a short-run effect on manufacturing output growth of SSA countries despite its long-run positive effect. Also, all other variables have estimates that are not statistically significant in the short-run regression result, judging from their higher p-values than the highest significance level of 10%. This means that they do not have significant short-run effect on manufacturing output growth of SSA countries.

The logic behind this finding is that, increase in a country's attraction to foreign capital, will bring much benefits to its productive sector through an increased investment resources for its domestic production which facilitates more outputs. The finding of this study supports the empirical findings of previous studies like Ekienabor *et al.* (2016) and Onodje and Farayibi (2020).

The first period lag of manufacturing output growth also has a positive estimate that is statistically significant, which is 0.832, with a p-value of 0.000, signifying that increase in manufacturing output growth in the last period will lead to a significant increase in manufacturing output growth in the current period and vice versa. The cross-sectional dependence test conducted for this model shows a statistic value of 1.519 and p-value of 0.168 which is not statistically significant. This signifies that the test's null hypothesis of absence of cross-sectional dependence could not be rejected and hence, the model is free from cross sectional dependence problem.

5. Conclusion and Recommendations

The study examined the impact of global factors on manufacturing output growth in Sub-Sahara African countries. By employing the dynamic fixed effects estimator on the secondary panel data obtained for forty (40) SSA countries, the findings revealed that foreign direct investment is the main global factor that have positive impact on manufacturing output growth in the countries of the region. This implies that the extent to which a country can attract and get foreign capital is paramount to promoting manufacturing output growth. This is because, more inflow of foreign capital causes an increase in investible resources and thus, promote productive activities, including those in the manufacturing sector. It is therefore concluded that, the inflow of foreign investment is vital to boosting manufacturing output in SSA countries. It is recommended that policymakers in these countries should make efforts to attract further inflows of foreign capitals by ensuring a stable and business friendly economic environment through their macroeconomic policies of maintaining a low level of inflation and developing business-enhancing infrastructures.

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