DOMESTIC MACROECONOMIC DRIVERS OF INDUSTRIALIZATION IN NIGERIA: STATUS AND PROSPECTS FROM THE MANUFACTURING SUB-SECTOR

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Abstract:
While most advanced economies are in the process of de-industrializing their economies, efforts by successive governments to transform the economy of Nigeria, from a commodity-driven to an industrialized one, has not yielded much fruit despite several industrial policies and reforms. In Nigeria, the problem of industrialization is not the difficulty in attaining economic growth but the predicament of the extent to which attention is paid to infrastructure, human capital, private sector credit, technology, foreign direct investment, domestic price and exchange flexibility as determinants of the manufacturing sub-sector’s utilization capacity rate and its productivity index. Based on the United Nations/World Bank success yardsticks with theoretical framework rooted in the Prebisch-Singer Hypothesis and the endogenous growth model, this study utilizes the K-class estimation procedure on Nigeria’s time series between 1990 and 2016. The result obtained indicate that infrastructural development, appropriate moderate institutional frameworks, bank credit, foreign direct investment, electricity, a stable exchange rate, low inflation and economic diversification are key drivers of industrialization. The findings also confirm that unless the Nigerian economy achieves improved infrastructure delivery and institutional framework as well as stable domestic and currency prices, the efforts towards economic diversification may be counterproductive. It is therefore expedient that Nigeria focuses on building strong macroeconomic fundamentals that would accentuate its take-off to industrialization.

Key words: diversification, gross domestic product, industrialization, macroeconomy, manufacturing, Nigeria

JEL classification code: E24, O14, O11, L6, N67

1. INTRODUCTION
Industrialization, a major macroeconomic goal of every developing nation, aims at increasing the pace of economic growth and ensuring swift multi-sectoral economic transformation. It refers to a sustained pattern of rapid growth of manufacturing value added, and Todaro and Smith (2011) see it as a process of building up a country’s capacity by processing raw materials for consumption and for further production. The World Bank Development Report, (1987) asserts that industrialization is an essential requirement for economic development because it is: a training ground for skills development; a provider of employment, domestic, and foreign earnings; a necessary condition for structural change and diversification; can increase flexibility of an economy as well as reduce economic dependence.

To Zattler (1996) and Dijkstra (2000), industrialization is desirable for two main reasons: it enables the manufacturing sector to foster growth in productivity and technology spillovers to other sectors of the economy; and it diversifies a developing economy, away from primary production, into wider revenue streams thereby improving the country’s terms of trade. However, the degree to which an economy can industrialize depends on the prevailing domestic macroeconomic environment as well as the complementarities amongst economic policies targeted at shifting resources from low-productivity to high-productivity sectors.
Nigeria’s Vision 20:2020 aims to transform Nigeria into: the twentieth largest economy in the world by 2020, the 12th largest world economy by 2050, and into a sound, unwavering and globally resilient economy with a GDP of not less than US$900 billion and a per capita income of $4,000 per annum (CBN, 2009). Nigeria is therefore desirous of prosecuting an industrial strategy aimed at accomplishing immense global competitiveness in processed and manufactured commodities. Being an oil-dependent economy, Nigeria is yet to achieve a significant accomplishment in its intent to join the league of industrial nations. The structure of the Nigerian economy is representative of an underdeveloped economy as it relies on the extraction of primary produce, crude oil, for 95% foreign exchange and more than 85% of its government revenue.

Table 1 represents oscillating evidence of industrial growth across its broad sub-sectors including manufacturing, mining, consumer goods, capital goods, among others.

Table 1: Industrial Sector Growth by Broad Sub-sectors 2007-2017Q1

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<tbody>
<tr>
<td>Primary goods for</td>
<td>0.40</td>
<td>0.40</td>
<td>0.70</td>
<td>0.80</td>
<td>0.68</td>
<td>0.76</td>
<td>0.99</td>
<td>1.05</td>
<td>2.81</td>
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<td>Household Consumption</td>
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<tr>
<td>Primary goods for</td>
<td>6.80</td>
<td>2.40</td>
<td>3.40</td>
<td>2.20</td>
<td>9.38</td>
<td>4.98</td>
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<td>3.89</td>
<td>3.93</td>
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<td></td>
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<td></td>
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<tr>
<td>Manufacturing</td>
<td>9.57</td>
<td>8.89</td>
<td>7.85</td>
<td>7.57</td>
<td>17.82</td>
<td>13.46</td>
<td>21.80</td>
<td>14.72</td>
<td>-1.46</td>
<td>11.69</td>
<td>8.32</td>
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<tr>
<td>Mining</td>
<td>-4.32</td>
<td>5.91</td>
<td>0.66</td>
<td>5.38</td>
<td>2.41</td>
<td>-4.78</td>
<td>-12.81</td>
<td>-1.13</td>
<td>-5.27</td>
<td>-6.40</td>
<td>-4.27</td>
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<tr>
<td>Electricity, Gas and</td>
<td>4.93</td>
<td>3.74</td>
<td>3.23</td>
<td>3.28</td>
<td>32.52</td>
<td>13.04</td>
<td>18.81</td>
<td>-3.32</td>
<td>-3.96</td>
<td>3.85</td>
<td>-1.14</td>
</tr>
<tr>
<td>Water</td>
<td></td>
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<tr>
<td>Consumer Goods</td>
<td>4.60</td>
<td>5.70</td>
<td>9.20</td>
<td>9.30</td>
<td>6.73</td>
<td>3.10</td>
<td>6.62</td>
<td>6.77</td>
<td>5.95</td>
<td>4.46</td>
<td>4.31</td>
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<tr>
<td>Capital goods</td>
<td>16.90</td>
<td>22.3</td>
<td>15.5</td>
<td>15.4</td>
<td>11.72</td>
<td>11.81</td>
<td>10.42</td>
<td>17.11</td>
<td>15.84</td>
<td>16.16</td>
<td>12.88</td>
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<tr>
<td>Durable</td>
<td>1.60</td>
<td>2.10</td>
<td>3.50</td>
<td>3.00</td>
<td>1.76</td>
<td>1.05</td>
<td>0.89</td>
<td>2.53</td>
<td>1.65</td>
<td>0.79</td>
<td>0.69</td>
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<tr>
<td>Non-durable</td>
<td>2.40</td>
<td>1.90</td>
<td>3.10</td>
<td>3.50</td>
<td>3.53</td>
<td>1.36</td>
<td>4.61</td>
<td>2.88</td>
<td>2.99</td>
<td>2.71</td>
<td>2.77</td>
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<tr>
<td>Semi-durable</td>
<td>0.60</td>
<td>1.60</td>
<td>2.70</td>
<td>2.70</td>
<td>1.43</td>
<td>1.31</td>
<td>0.96</td>
<td>0.85</td>
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</table>


Of particular interest is that the manufacturing sub-sector occupies prominence as it supplies inputs to the other sub-sectors which came to an all-time low in 2015 and further took a downturn in the first quarter of 2017 following positive growth in 2016. These observed fluctuations in the manufacturing sub-sector growth may have affected the overall industrial growth in Nigeria. There are no doubts about the positive contributions of its real sector activities to economic growth but what remains an issue is the current deterioration in the rate at which Nigeria is pursuing its industrialization process as observed in Figure 1.
A foremost cause of this deterioration is Nigeria’s low level of industrialization as evidenced by the negative growth in industrial output and in declining average capacity utilization which is caused by under-utilization and inefficient usage of capital. The industrial sector’s contributions to the GDP as shown in Figure 1 have also declined over the years; from an all-time high of nearly 72% between 1971 and 1975 to 2.4% between 2006 and 2010 and -9% as at the last quarter of 2016. Figure 2 shows wide oscillations in the manufacturing sub-sector production that measures manufacturing production growth rate in Nigeria.

Source: Nwokoye, Kalu & Nwosu (2017)

Figure 2: Trend of Manufacturing Production Growth Rate in Nigeria 1970-2014

Source: CBN Statistical Bulletin (various issues)

Figure 2 depicts a positive trend over time and the fitted regression line supports the view of an upward trend of manufacturing production growth rate. This is shown by the positive slope coefficient of 0.024. By implication, manufacturing production growth rate has been on the increase over the study period but this increase is marginal and not significant.
Nigeria’s manufacturing sub-sector comprises oil refining, cement, food, beverages and tobacco; textiles, apparels and footwear, wood and wood products, pulp paper and paper products; electrical and electronics, basic metal, iron and steel, motor vehicles and assembly and other manufacturing. Egbon (1995) viewed the Nigerian manufacturing sub-sector as the main instrument of rapid growth, structural change and self-sufficiency. A number of industrial policies have been geared towards improving the economic performance of the supply side of the economy. However, in the face of these policies, the performance of the manufacturing sub-sector has not been impressive as shown in Figure 3.

![Figure 3 Share of Manufacturing in GDP (%)](image)

**Source:** Central Bank of Nigeria, Statistical Bulletin (Various Issues)

The share of manufacturing to the GDP which is another indicator of the performance of manufacturing sub-sector was 7.2% in 1970. It fell to 5.2% in 1975 before increasing gradually to 11.2% in 1982. Following the depressing state of the economy in the 1980s, manufacturing share in the GDP fell and remained in the range of 7.8% and 8.4%. With the unsteady growth in manufacturing production since 1992, the contribution of the manufacturing industry to the GDP fell. For instance, between 1993 and 2001, it ranged between 8.3% and 3.4%. This is a strong indication that the manufacturing subsector contribution has been dwindling. Between 2002 and 2007, manufacturing share in the GDP witnessed only marginal increase of 3.0 percent. A decline in manufacturing share in the GDP was witnessed from 2008 to 2009 but it rose consistently from 7% in 2010 to 10% in 2014. Its further decline to -1.3% in the last quarter of 2016 left a lot to be desired. Even though its contributions to the GDP shrank by N80 billion in nominal terms as at the first quarter of 2017, by the third quarter of the same year, it stood at 8.81%.

Figure 4 shows that the average capacity utilization for the manufacturing subsector was 76.6% in 1975. It fell from 70.1% in 1980 to 43 .8% in 1989. The capacity utilization of the manufacturing subsector further dwindled in the 1990s and ranged between 40.3% and 34.6%; while 36.1% and 54.8% were recorded in 2000 and 2005 respectively. The improved performance in the manufacturing subsector between 2000 and 2005 was attributed to a number
of factors including the relative macroeconomic stability and the regular supply of petroleum products.

Figure 4: Average Capacity Utilization in Manufacturing (%)

![Average Capacity Utilization in Manufacturing (%)](image)

Source: CBN Statistical Bulletin (2016)

The capacity utilization of the manufacturing sub-sector further dwindled to 53.3% in 2006. A brief spike in manufacturing capacity utilization was observed in 2010 as capacity utilization stood at 56.79% before peaking at 60.3% in 2014. This development was attributed to the increase in manufacturing activities occasioned by increased investment in the pharmaceutical, food, beverages and automobile sectors (CBN, 2014).

An appraisal of Nigeria’s manufacturing subsector indicates that it has not improved in the light of the various industrial policies which the country has been adopting (including the recent trade and financial liberalization policy, tax policies, export promotion strategies and anti-dumping laws, amongst others). This underscores the need for implementing policies which would enable the manufacturing subsector to contribute significantly to the industrialization of the Nigerian economy.

According to Adoghor and Brown (2009), Nigeria’s manufacturing subsector suffers from low level of technology, exclusive public sector ownership of the core industrial projects (CIPs) and utility enterprises, low level of capacity utilization, low investment and high production costs. Loto (2005) asserted that the factors, such as a weak raw materials base resulting in excessive dependence on imported inputs, inadequate linkages among the manufacturing subgroups partly due to the inefficient performance of the basic industries and little investment in basic research, poor technological base to support growth in manufacturing activities, foreign exchange scarcity amongst others, militate against increased industrial production and diversification of the Nigerian economy.

The major objective of this paper is to model Nigeria’s industrialization process for the period 1990 to 2016 as a response variable to the dynamic relationship existing between its manufacturing subsector and the identified drivers and is restricted to determining, whether or not, these variables impact, significantly or not, on the manufacturing output and if it does, whether these impacts drive or inhibit the sectoral growths of Nigeria’s industrializing process. To this effect, this paper is structured as follows: Section one captures the introduction, Section
two contains the theoretical framework of the study, Section three contains the research procedure, Section four presents and discusses the results while Section five concludes the study and makes some policy recommendations.

2. THE THEORETICAL FRAMEWORK:
The Prebisch-Singer hypothesis (PSH) is credited to Prebisch (1950) and Singer (1950) and emphasizes that the economy cannot grow based on production and export of primary products because the ratio of export prices to import prices (that is the terms of trade) for countries which are heavily reliant on exports of primary commodities declines continuously. In summary, the PSH provides a case in support of economic diversification by explaining the disadvantages of specializing in extractive production in general (as is the case with Nigeria). In principle, these arguments can therefore serve as a rationale and as a theoretical justification for embarking on industrialization through economic diversification.

The endogenous growth model also provides the theoretical framework for this study because it has become a benchmark framework for analyzing long-run determinants of output. It is also hinged on the assumption of increasing returns to scale for the manufacturing sector and constant returns to scale for the primary sector. It reveals that a country's manufacturing output will grow faster (or slower) than that of the rest of the world if it had an initial comparative advantage in manufacturing (or primary) sector as hypothesized by Prebisch-Singer (1950).

The endogenous growth models explain that economic progress can be achieved within the system governing the production process instead of by forces operating outside the system as presented by the Solow residual in the neoclassical growth model. Most of the endogenous growth models introduce factors like human capital, knowledge and infrastructure, whose accumulation is not subject to the assumption of diminishing marginal returns. An endogenous growth model of the \( AK \) type as introduced by Newman (1957) assumes an economy with a production function specified as:

\[
Y = aK
\]

where output \( (Y) \) is proportional to the capital stock \( (K) \); the marginal product of capital is simply the constant \( (a) \). Furthermore, the endogenous growth theory hinges on the notion that there are substantial external returns to capital especially human capital as each new idea (knowledge) makes the next idea possible hence knowledge can grow indefinitely. The new growth theorists believe that research/development and investment in human capital are the keys to economic progress, therefore, Equation 1 may be further expressed as

\[
Y_t = AK_t^\alpha L_t^\beta
\]

where \( \alpha \) and \( \beta \) are the respective shares of capital and labour in the production process. By dividing Equation 2 by \( L \), the intensive form of the equation becomes:

\[
y_t = Ak_t^\alpha
\]

where \( (Y) \) is economic progress; \( (A) \) is any factor that influences the level of domestic production technique, \( (K) \) is capital per worker. This model assumes increasing returns to scale and diminishing marginal productivity of factor inputs. In order to ascertain and interrogate Nigeria’s domestic macroeconomic drivers as part of the reasons for industrialization in Nigeria, this study relies on the United Nations/World Bank success yardsticks which propose that the core explanatory variables for industrialization include the per capita GDP which captures the market size, human capital captured by labour employment in the manufacturing
sector, FDI inflow into the manufacturing sector (which captures the extent of spillovers), commercial bank credit to the private sector, infrastructural development captured by electricity consumption, and interest rate (which captures the extent of macroeconomic stability).

3. ECONOMETRIC PROCEDURE AND DATA

3.1 Econometric Procedure:
As noted earlier, Nigeria has designed several programs and policies aimed at transiting from a resource-based economy to an industry-based economy. However, the suboptimal outcome from such policies and programs has reawakened the pursuit for understanding macroeconomic fundamentals that could be manipulated to achieve such goals. This study adopted a macroeconometric procedure in order to understand the behavior of the macroeconomic environment within which the manufacturing subsector operates. In addition to the preliminary review of literature, the following macroeconomic indicators and variables for this study were identified: manufacturing sector productivity (MP), manufacturing capacity utilization (MC), economic diversification (ED), quality of institution (QIS), quality of infrastructure (QIF), exchange rate volatility (ERV), inflation (INF), foreign direct investment (FDI), industrial electricity consumption (ELEC), and deposit money banks credit to the manufacturing sector (MCRE).

Due to observed endogeneity, the K-class estimation was adopted for the macroeconometric estimations. The K-class model is specified as follows:

\[ y_{it} = \Pi_{i} + \sum_{p=0}^{P} \Psi_{i,k} X_{i,k,t} + \sum_{n=1}^{N} Z_{i,n,t} + \epsilon_{i,t} \quad i = 1, ..., T \]

Where \( y_{it} \) is a 4 x 1 column vector of response variables such that \( y_{it} = MP, aMP, MC, aMC \). \( X_{i,k} \) is a 4 x N vector of explanatory variables such that \( X_{i,k} = ED, QIS, QIF, ERV, INF, FDI, ELEC, MCRE \). Also, \( Z_{i,n} \) is 2 x N vector of instrumental variables such that \( Z_{i,n} = RGDP, manufacturing employment (MEMP), private sector operating surpluses (PROF), lending rate (LER) and lagged explanatory and Z variables. \( \Pi_{i} \) and \( \psi_{i,k} \) are intercept and slope parameters respectively.

In estimating K-class models, the choice of \( k \) and covariance matrix affects the unbiasedness of the estimates. The k-class estimator, is defined as:

\[ \psi_{k} = (X'(I - kM_{x})X)^{-1}X'(I - kM_{x})y \]

Where \( k = \lambda - \alpha(n - K) \), \( M_{z} = I - ZZ' \), \( \lambda \) is the root that minimizes the variance-covariance matrix such that \( |Q_{1} - \rho Q| = 0 \) (where \( Q_{1} \) is the variance-covariance matrix of the residuals from the regressions of \( y_{i} \) on \( X_{i} \) and \( Q \) is the variance-covariance matrix of the residuals from the regressions of \( X_{i} \) on \( Z \)). The covariance matrix estimator is defined as:

\[ s^{2}(X'(I - kM_{x})X)^{-1} \]

3.2 Data Construction and Data Source
Data used in all estimations were sourced differently. Real gross domestic product (RGDP), manufacturing capacity utilization (MC), manufacturing output (MANO), inflation (INF), DMBs’ credit to the manufacturing sector (MCRE) and exchange rate (EXR) were sourced from the CBN Statistical Bulletins (2014 & 2016). Quality of institution (QIS) and quality of infrastructure (QIF) were sourced from the International Monetary Fund’s World Economic...
Outlook (2017). Electricity consumption (ELEC) and industrial labour participation (INDL) were obtained from World Bank’s World Development Indicators (2017).

In addition, the diversification index (DI), concentration index (CI), manufacturing sector labour productivity (MP) and exchange rate volatility (EXV) were constructed as follows:

**Diversification index (DI):** DI is a measure of the degree of economic diversification of an economy. Following Dimnwobi, et al (2017), we employed the Herfindahl–Hirschman (H) approach to computing DI. DI is computed as the sum of the squares of the sectoral shares of the economy’s output. Supposing that N sectors share all economic activities, each one with a contribution $k_i$ and sectoral share $S_i = \frac{k_i}{\sum_{j=1}^{N} k_j}$ Then the DI can be expressed as: $DI = \sum_{i=1}^{N} S_i^2$

Since DI computed using Herfindahl–Hirschman (H) procedure can range from $1/N$ to one, we place a restriction such that it ranges from zero to one:

$$DI^* = \frac{DI - \frac{1}{N}}{1 - \frac{1}{N}}$$ for $N > 1$. $H^*$ ranges from 0 to 1.

According to Tauer (1992) cited in Dimnwobi et al (2017), a $DI^*$ of 0.00 and 0.01, higher than 0.01 but below 0.15, between 0.15 to 0.25 and above 0.25 indicate a highly diversified economy, somewhat diversified economy, moderately diversified economy and undiversified economy respectively.

**Concentration Ratio (CR):** The CR is a measure of sectoral concentration. The manufacturing sector concentration ratio was computed as follows:

$$CR_i = \frac{1}{100 \frac{MANO_i}{RGDP_i}}$$

**Exchange Rate Volatility (ERV):** ERV measures the pace at which currency prices move higher or lower, and how wildly they swing. In other words, it is the standard deviation of the change in exchange rate with a specific time horizon. Following Igbanugo and Eze (2017), we computed ERV as follows:

$$ERV_i = \frac{(EXR_i - EXR_{i-1})^2}{X}$$

where $X = \sum_{i} (EXR_i - EXR_{i-1})^2$ and $N =$ number of observations

**Manufacturing Labor Productivity (MP):** Labour productivity measures the output per worker in the manufacturing sector. It is computed as $MP_i = \frac{MANO_i}{ML_i}$

4. **PRESENTATION AND DISCUSSION OF RESULTS:**
We started the econometric analysis with the evaluation of the time series properties of the data. Stationarity and cointegration test indicated that the time series are both an integrated and cointegrated series. The Hausman test indicated that diversification index and manufacturing credit are endogenous in the manufacturing productivity and manufacturing capacity utilization models, respectively. The endogenous problem was however taken care of by the k-class estimation. Four models were estimated with the k-class estimation procedure. Table 1 contains
the regression estimates for manufacturing productivity (Model 1) and manufacturing capacity utilization (Model 2).

The results for Model 1 show that diversification and inflation strongly impact on manufacturing productivity while exchange rate volatility, industrial electricity consumption, quality of institution and quality of infrastructure had weak impacts on productivity in the manufacturing subsector. Results for Model 2 show that diversification, exchange rate volatility, electricity consumption and quality of infrastructure strongly impacted on the manufacturing capacity utilization rate for the period 1990 to 2016 as presented in Table 2.

Table 2: Regression Estimates for manufacturing productivity and manufacturing capacity utilization

<table>
<thead>
<tr>
<th></th>
<th>Manufacturing Productivity (Model 1)</th>
<th>Manufacturing Capacity Utilization (Model 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diversification index</td>
<td>0.0224(0.0106)**</td>
<td>0.0273(0.0154)*</td>
</tr>
<tr>
<td>Bank Credit to Private Sector</td>
<td>0.0072(0.0053)</td>
<td>0.0079(0.0045)</td>
</tr>
<tr>
<td>Exchange rate volatility (EXV)</td>
<td>-0.0246(0.0084)***</td>
<td>-0.0596(0.0231)**</td>
</tr>
<tr>
<td>Inflation (INF)</td>
<td>-0.9555(0.6618)*</td>
<td>-0.0880(0.5204)</td>
</tr>
<tr>
<td>FDI</td>
<td>0.1202(0.1432)</td>
<td>0.1290(0.1227)</td>
</tr>
<tr>
<td>Electricity consumption (ELEC)</td>
<td>0.0104(0.0202)</td>
<td>0.0180(0.0098)*</td>
</tr>
<tr>
<td>Quality of Institution (QIS)</td>
<td>-0.7422(0.0672)***</td>
<td>-0.8221(0.0100)***</td>
</tr>
<tr>
<td>Quality of Infrastructure (QIF)</td>
<td>-0.4562(0.1502)***</td>
<td>-0.3847(0.1580)***</td>
</tr>
<tr>
<td>QIS + 2.5</td>
<td>0.0937(0.0435)***</td>
<td>0.1005(0.0572)*</td>
</tr>
<tr>
<td>QIF + 2.5</td>
<td>0.6008(0.2431)***</td>
<td>0.1649(0.0128)***</td>
</tr>
<tr>
<td>INF – 5.0</td>
<td>(0.0372)**</td>
<td>0.0773(0.0323)**</td>
</tr>
<tr>
<td>Obs</td>
<td>116</td>
<td>116</td>
</tr>
<tr>
<td>R-square</td>
<td>0.84</td>
<td>0.89</td>
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<tr>
<td>DW</td>
<td>2.06</td>
<td>1.95</td>
</tr>
<tr>
<td>K</td>
<td>1.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Covariance Matrix</td>
<td>K-class</td>
<td>K-class</td>
</tr>
</tbody>
</table>

* *, **, *** indicates 10%, 5% and 1% significance level

Source: Authors’ computation using E-views version 10

Exchange volatility can affect productivity and capacity utilization through change in the relative costs of production and increase in transaction costs as argued by Klein et al. (2003). Exchange rate volatility can also undermine productivity and capacity utilization through its effect on investment, inventories and employment. By decreasing the credit available from the banking system, exchange rate volatility can reduce investment and consequently productivity. According to Grier and Smallwood (2007), the negative effect of exchange rate volatility on productivity might be more severe in developing economies than developed economies due to a high degree of dollarization and low financial development.

Table 3 contains the regression estimates for models 3 and 4. It also indicates that expanding or concentrating activities on the manufacturing sector may not change the negative effect of inflation and exchange rate volatility on the manufacturing subsector.
Table 3: Regression estimates of expanding or concentrating activities on the manufacturing productivity and capacity utilization respectively.

<table>
<thead>
<tr>
<th></th>
<th>Manufacturing Productivity (3)</th>
<th>Manufacturing Capacity Utilization (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diversification index</td>
<td>0.0016(0.0009)**</td>
<td>0.0012(0.0007)**</td>
</tr>
<tr>
<td>Bank Credit to Private Sector (MCRE) x concentration Index</td>
<td>0.0108(0.0035)****</td>
<td>0.0032(0.0018)**</td>
</tr>
<tr>
<td>Exchange rate volatility (EXV) x concentration Index</td>
<td>-0.5088(0.0939)*****</td>
<td>-0.0107(0.0035)*****</td>
</tr>
<tr>
<td>Inflation (INF) x concentration index</td>
<td>-0.2333(0.0153)****</td>
<td>-0.0083(0.2194)</td>
</tr>
<tr>
<td>FDI x concentration index</td>
<td>0.1530(0.0849)**</td>
<td>0.0083(0.0034)</td>
</tr>
<tr>
<td>Electricity consumption (ELEC) x concentration Index</td>
<td>0.2737(0.0669)****</td>
<td>0.0001(0.0193)</td>
</tr>
<tr>
<td>Quality of Institution(QIS) x concentration index</td>
<td>0.0274(0.0669)</td>
<td>0.5868(0.2999)**</td>
</tr>
<tr>
<td>Quality of Infrastructure(QIF) x concentration Index</td>
<td>0.1506(0.0872)**</td>
<td>0.2939(0.2104)</td>
</tr>
<tr>
<td>QIS + 2.5 x concentration index</td>
<td>0.6762(0.1331)****</td>
<td>0.3200(0.1196)****</td>
</tr>
<tr>
<td>QIF + 2.5 x concentration index</td>
<td>0.3389(0.1560)****</td>
<td>0.6300(0.2020)****</td>
</tr>
<tr>
<td>INF – 5.0 x concentration index</td>
<td>0.1465(0.0721)****</td>
<td>0.0991(0.0362)****</td>
</tr>
</tbody>
</table>

| Obs                          | 116                          | 116                          |
| R-square                     | 0.70                         | 0.73                         |
| DW                           | 1.85                         | 1.95                         |
| K                            | 0.5                          | 2.0                          |

Covariance Matrix

K-class K-class

* *, **, *** indicates 10%, 5% and 1% significance level

Source: Authors’ computation using E-views version 10

The current quality of institutions and infrastructure appears to undermine both capacity utilization and productivity. This finding corroborates those of Nickell and Layard (1999) and Acemoglu and Johnson (2005). Inefficient institutions raise the cost of enforcing contracts and transaction costs thereby impeding firm performance. Infrastructure is a core determinant of industrialization. As a result, weak transportation infrastructure may raise transportation and maintenance costs, raise contract and transaction delivery time, and limit firms’ market reach as well as their market shares. Similarly, poor energy infrastructure may raise transaction cost as well as limit the hours of work. Poor human capital development and health infrastructure will also reduce both the quantity and quality of human capital stocks available to the firms.

The regression results also show that diversification, bank credit, FDI and electricity consumption are positively related with firms’ productivity and capacity utilization. As shown in estimates for both Models 1 and 2, more of the variables are either weakly significant or not significant. FDI is important for industrialization through its role in augmenting productive capital in capital-scarce countries. Other benefits of FDI include importation of new technology and managerial know-how as well as access to foreign markets. Although the standard neoclassical model predicts that FDI would raise firms’ productivity through increased capital stocks and technological transfers (Findlay, 1978), Van Pottelsberghe de la Potterie and Lichtenberg (2001) argued that this prediction may be undermined. They noted that FDI inflow might not be accompanied by technological transfer if the multinational enterprises do not invest in R&D in the host country. This argument is plausible since most foreign firms invest
in the host countries in order to exploit their technological advantage rather than to diffuse their technology.

Availability of loanable funds enhances production and market expansion and investment in R&D. R&D is the engine of innovation and technological advancement. As investment in R&D increases, firms’ technology and innovativeness improve thereby lowering the cost of production and increasing productivity and profitability. Similarly, availability of credit also enhances the obtained value of assets by raising their prices. This finding corroborates those of Wa (2005) and Aurangzeb (2012) in which they provided evidence that credit to the private sector drives industrial development in Macao and Pakistan respectively.

Energy is critical for both productivity improvement and capacity utilization. There is hardly any production activity that is done without energy input. Given the acute shortage of energy supply in Nigeria, firms respond in a number of ways. These include investments in energy efficient technology options, out-sourcing of the production of energy-intensive intermediate inputs, and self-generation of energy for all production activities. Whichever option that a firm takes raises operational costs and reduces capacity utilization and productivity. Regression coefficients for models 3 and 4 indicate that concentrating activities in the manufacturing sector may improve the effect of electricity consumption, bank credit and FDI on productivity and capacity utilization. Economic diversification appears to be significant (howbeit, weakly significant) in all regressions, thereby suggesting that, although diversification is critical for industrialization, the current state of diversification is low.

In all estimations, we adjusted the quality of institutions, infrastructure and inflation. While 2.5 points were added to both quality of institution and quality of infrastructure, 5.0 points were taken away from inflation. This was to enable us obtain evidence for the effects of strong institutions, good infrastructure and moderate inflation on productivity and capacity utilization. The results thus obtained show that strong institutions, good infrastructure and moderate inflation could be strong drivers of industrialization.

5. POLICY IMPLICATIONS AND RECOMMENDATIONS:
Industrialization has been identified as the engine of growth. All advanced economies started their journey towards advancement through industrialization. The findings of this study indicate that diversification into the manufacturing sector is a prerequisite for industrialization. In the same vein, access to credit, FDI inflows, an adequate supply of electricity, strong institutions and adequate provision of infrastructure are essential drivers of industrialization. Exchange rate volatility and inflation are critical domestic macroeconomic fundamentals that undermine industrialization. The study suggests that if diversification is achieved without controlling inflationary and exchange rate pressures, the health of the industrial sector would still be in jeopardy. Thus, to achieve industrialization, currency/price gyrations and high inflation must be tamed. This also points to the critical role of institution in achieving industrialization. For instance, the institutional framework that involves property rights, legal institutions, labor market institutions, monetary and fiscal policy frameworks are needed to achieve low inflation, stable exchange rate, internalize the gains of FDI and achieve adequate and sustainable energy supply. It is therefore expedient that Nigeria should focus on building strong macroeconomic fundamentals that would accentuate its take-off to an industrialized economy.
References


