

**SRIWIJAYA INTERNATIONAL JOURNAL OF DYNAMIC
ECONOMICS AND BUSINESS**
<http://ejournal.unsri.ac.id/index.php/sijdeb>

**Industrial Capacity and Economic Development: The Role
of Institutional Quality and Monetary Policy in Nigeria**

Courage Ose Eburajolo¹, and Ewere F Okungbowa²

^{1,2}Department of Economics, Finance & Investment, Benson Idahosa University,
Benin City, Nigeria

Corresponding author: cebebhahon@biu.edu.ng

Abstract: The moderating effect of the two variables, namely institutional quality and monetary policy, in the link between manufacturing sector performance and economic development in Nigeria between the period 2000Q1 and 2024Q4, have been investigated in this study. The results from the use of the ARDL framework to the quarterly time series data indicates that the path dependent growth theories are supported by the findings, since economic development from the past has significant impact on the current economic development. The manufacturing sector has a positive and statistically significant impact on the Human Development Index (HDI). Of particular interest, real interest rates exhibit a stronger effect on economic development via the manufacturing sector channels than broad money supply (M2). The institutional quality variable (regulatory quality) does not have a statistically significant moderating effect, indicating a lack of institutional quality in implementing governance in developing economies. The results support the Rostow's stage theory as these findings quantify the intertemporal spillover effects of development and shed light on monetary policy transmission heterogeneity in the endogenous growth field. There is a special focus on interest rate targeting to stimulate manufacturing investment and institutional mechanisms to guarantee developmental continuity in policy recommendations.

Keywords: Industrial Productivity, Economic Development, Monetary Policy,
Regulatory Quality

Introduction

The economy of Nigeria has significant mineral and agricultural potentials which can be harnessed for industrial transformation and economic development, similar to what has happened in industrial economies (Ezeanyej, Usifoh, Umeuzuegbu, & Ejefobihi, 2023; Szirmai, 2009). Despite all such blessings and development programs such as the National Economic Empowerment and Development Strategy (NEEDS) of 2004, Vision 2020 (now

2030), and pledges to the Sustainable Development Goals, the industrial sector is still far behind its productivity potential in comparison to other African countries. The situation is highlighted by more recent data, as Nigeria's manufacturing value added (VAA) in GDP fell from 9.2% in 2000 to about 8.1% in 2023, while other countries, including South Africa (12.1%) and Egypt (15.3%) had manufacturing VAA in GDP above 12% (World Bank, 2024). Moreover, Nigeria's HDI showed slight improvement from 0.459 in 2000 to 0.535 in 2022, placing it at position 161 out of 191 countries, which is significantly lower than the resource endowment adjusted average for Sub Saharan Africa (UNDP 2023). Over the last decade, industrial capacity utilization had been ranging between 54% and 58% that is almost below the optimum 70-80% level of productivity (CBN, 2023).

Nigeria's manufacturing sector continues to perform poorly despite policy interventions, which calls into question several theoretical and empirical issues. Industrial growth refers to the development of agro-based and supporting industries that boost productivity on a variety of production levels which normally involves favorable government policies and accessible financing mechanisms (Amoah & Jehu-Appiah, 2022; Singh & Kumar, 2021). Various factors are identified to constrain Nigeria's industrial potentials, these include; lack of infrastructure and technical capacity, Dutch disease effect of oil boom era, political and business environment and macro-economic policy inconsistencies (Keji, 2023; Adofu, Taiga, & Tijani, 2015). Underproduction in one industry is an important factor of raw material scarcity for the downstream sectors as observed by Turhan (2018), who points out that this situation creates cascades of underproduction across the value chain.

This investigation is driven by three different research gaps. There is a theoretical lacuna in the use of Rostow's stages of growth in actual industrial development of Nigeria today. Rostow (1960) suggested the development of manufacturing sector as the "take-off" prerequisite, but, no study has yet tested whether Nigeria's manufacturing capacity acts as the transition mechanism to higher stages of development or whether intertemporal development spillovers (phase-to-phase transitions) occur as predicted by the theory. Second, diverging results on the monetary policy transmission to the real sector are obtained from studies, with some reporting positive relationships (Ubi, Effiom, & Eyo, 2012; Igbiniedion & Ogbeide, 2016), while others report insignificant or negative relationships (Christopher & Uduak, 2022). The inconsistencies indicate possible model misspecification, including lack of institutional moderators. Third, methodological problems were noted in that previous Nigerian studies mostly used annual data which cannot adequately detect the short-run dynamics and the long-run equilibria and deal with mixed-order integration (I(0) and I(1) variables).

This study contributes to the knowledge in three ways. In theory, we have extended Rostow's stage theory by measuring the intertemporal elasticity of development transmission and added monetary policy as a conditioning mechanism of the manufacturing-development nexus. To take into account short-run dynamics and long-term relationships, and to allow for mixed integration orders, which is a methodological improvement over previous studies

based on OLS, the ARDL bounds testing technique is used to empirically assess the dynamic effects and long-term relationships. The ARDL bounds testing technique is used to empirically test the dynamic effects and long-term relationships in order to account for the short-term dynamics and long-term relationships, and to allow for mixed integration orders, which is a methodological advancement over previous OLS based studies. Policy-wise, we point to the existence of different thresholds of policy quality, real interest rates and broad money supply; and suggest policy interventions to monetary authorities and industrial policy makers.

Literature Review

Theoretical Literature

This study brings together three complementary theoretical approaches: the Stages of Economic Growth, the endogenous growth approach and the monetary transmission mechanism approach.

The main theoretical support is provided by Rostow's stages of growth (1960). Rostow identified 5 stages of development: (1) traditional society, (2) preconditions of take-off, (3) take-off, (4) drive to maturity, (5) high mass consumption. Importantly, the manufacturing sector development and increased secular education as preconditions in this stage trigger the take-off stage that is typified by rapid industrialization and a high standard of living. The transition to the maturity stage relates to economic diversification, which helps to eradicate poverty and enhance living standards by diffusion effects from other stages. What does Rostow argue is directly connected to development and manufacturing capacity? It functions via three channels: (a) manufacturing creates forward linkages with services and backward linkages with agriculture and extractive industries; (b) manufacturing is characterized by increasing returns to scale and technological dynamism not found in primary industries; (c) manufacturing job creation generates middle class income structure that requires better governance and public services (Szirmai, 2012). The relationship between the growth rate of HDI and the capacity utilization of manufacturing industry should be positive for Nigeria according to Rostow's framework, while past level of development should predict current level of development (the "stage transition" hypothesis).

In addition to Rostow, endogenous growth theory (Romer, 1986; Lucas, 1988) can be used to account for the sustained returns to manufacturing investments without diminishing returns. Romer (1986) showed that the returns to capital, investment returns and per-capita output can grow without bound as a result of knowledge spillovers and the accumulation of human capital. Lucas (1988) highlighted "human capital" in terms of education as the key to long-term growth. Why endogenous growth theory and not structural transformation theory? Structural transformation theory (Lewis, 1954) posits that the development mechanism is the reallocation of labour from agriculture to industry, but requires that labour is perfectly elastic at subsistence prices, which is not the case in the current Nigeria due to the minimum

wage policy and labour unions which creates wage rigidity. The endogenous growth theory is more suitable for Nigeria's environment in which the process of technological uptake, learning-by-doing in manufacturing, and policy-induced innovation lead to development rather than simply a reallocation of labour.

The third theoretical pillar is provided by the monetarist monetary transmission theory (Friedman, 1968). The quantity theory framework of Friedman ($MV = PY$) is a description of how fluctuations of money supply impact economic activity. The money supply theory of prices as enunciated in the simple quantity theory states that money has effects on prices only in the LR. However, in the modern view of monetarists, money has short-term real effects through credit channels, interest rate channels, and exchange rate channels. For what reason is monetarist transmission, not Keynesian? The interest rate sensitivity of investments that can be created within the Keynesian frameworks, can be frozen by a liquidity trap or be interest-insensitive investment, which could be the case in the financial repression environment in Nigeria. Drawing on the Nigerian context with shallow financial markets where direct credit allocation and reserve requirements are active policy tools, the focus on money supply and credit channels is more suitable (Christopher & Uduak, 2022).

Conceptual Framework and Hypotheses Development

The Human Development Index (HDI) is a composite index that measures the state of economic development based on three criteria: life expectancy, literacy/education, gross national income per capita (UNDP, 2023). According to UNIDO (2020), the countries with high HDI have stable governance system and quality regulatory system, while the countries with low HDI, such as Nigeria, have governance system disadvantaged and quality regulation system that has not yet become a stable system.

Institutional quality (or governance quality) is an indicator of the effectiveness and soundness of the institutional frameworks and their implementation. Cherif and Hasanov (2019) and Chang and Andreoni (2020) stress that the actual implementation of a policy rather than just the policy itself, is what is decisive for the outcome of the industries. Corruption, bureaucratic inefficiency and political instability in developing economies cause and exacerbate implementation gaps that systematically affect otherwise sound policies (Santiago & Zagato, 2024).

Monetary policy involves central bank measures to determine the amount of money in circulation and meet macroeconomic goals. Transmission channels are: (a) interest rate channel (impact on investment costs), (b) credit channel (impact on credit availability), (c) exchange rate channel (impact on international competitiveness), and (d) expectations channel (impact on the behavior of people in the future) (Popov & Steininger, 2023).

Manufacturing capacity is the production potential of the manufacturing subsector; it is usually measured as manufacturing value-added, which is the ratio of manufacturing value-added of manufacturing output to GDP. According to Obichukwu (2013), it is an overall productivity of the subsectors of mining, construction, and manufacturing. Manufacturing is known to be a catalyst for development in terms of employment generation, income generation, foreign exchange earnings and improvement of the living standard of the people

(Okeoma, Nwaobilor, & Amaechi, 2022). From a theoretical synthesis we test the following hypotheses:

H₁: Lagged economic development positively and significantly affects the transition to the current stage of economic development (Rostow's stage transition hypothesis).

H₂: An increase in manufacturing capacity has a positive effect on economic growth (Rostow's take-off hypothesis).

H₃: Institutional quality positively moderates the manufacturing-development relationship (implementation effectiveness hypothesis).

H₄: There is positive relationship between growth of broad money supply and economic development via manufacturing sector (monetarist transmission hypothesis).

H₅: The real interest rate has a negative effect on economic growth in the manufacturing sector (cost-of-capital hypothesis).

Empirical Literature and Gap Synthesis

Kaya (2010) based on Panel Data analysis of 64 emerging countries (1980-2003), identified manufacturing employment as the sector contributing the most to GDP per capita, and globalization to have boosted manufacturing growth. As in the Nigerian context, Aiyedogbon and Anyawu (2015) used the OLS technique on data from 1981-2013 and concluded that the real GDP, exchange rates, FDI and interest rates significantly affect the performance of industries. On the other hand, Bennett et al (2015) got no significant industrial index effect on growth using OLS for the period 1973-2013, and Oniyide and Ogunjinmi (2021) obtained insignificant short-run effect of manufacturing capacity utilization on growth, but significant long-run effect using cointegration and impulse response technique for 1980-2018.

The same inconsistencies are reflected in the evidence of monetary policy. On Nigerian data for the period 1970-2009, Ubi et al. (2012) obtained positive and significant relationship among money supply, exchange rate and interest rate with industrial output using VECM. Igbinedion and Ogbeide (2016) analysed the impact of ECM on the lending rates of the period 1980-2014, and concluded that all the lending rates (past and present) were negatively related to manufacturing performance, while broad money supply had positive and significant effects. Asiagwu, Utalor, and Anaele (2021) obtained from the OLS model on 1996-2019 data revealed that deposit rate, lending rate, and growth in money supply have all positive significant effects on the performance of the industries.

What are the reasons for these paradoxes? We find from our methodological review that research identifying monetary effects is generally based on OLS or ECM with limited attention paid to dealing with endogeneity or mixed integration orders. Moderators of institutional factors were not included in several studies which found insignificant impacts, although these studies used more powerful methodologies (VECM, ARDL). This study is the first in Nigeria to model monetary policy transmission via manufacturing channels while conditioning on institutional quality.

Methods

Data of quarterly time series is used from 2000Q1 to 2024Q4 (100 observations). The data used are from World Development Indicators (WDI) database, Central Bank of Nigeria (CBN) Statistical Bulletin and the United Nations Development Programme (UNDP) Human Development Reports. The Human Development Index (HDI) is measured annually by UNDP. Quadratic match-sum interpolation was used to make annual data quarterly data, while maintaining the annual averages (following the standard practice in development economics when quarterly observations of HDI are not available, but there are annual data). The quarterly frequency is suitable because: (a) monetary policy variables such as interest rates and money supplies are quarterly variables set by the CBN; (b) the manufacturing output information is quarterly; (c) the number of quarterly frequency is maximized for ARDL bounds testing. Manufacturing value added as a share of GDP. The regulatory quality index (Worldwide Governance Indicators, -2.5 to +2.5) was annual interpolated to quarterly data using quadratic match-sum, and is included in QGOV. RINT: Real interest rate (%) – quarterly (lending interest rate adjusted for inflation). M2: Broad money supply (% of GDP) – quarterly. Gross capital formation (% of GDP) – quarterly (control variable for domestic investment). Domestic credit to the private sector (% of GDP) – quarterly (control variable for financial depth).

$$\text{HDI} = f(\text{MANC}, \text{QGOV}, \text{RINT}, \text{M2}, \text{MANC} * \text{QGOV}, \text{MANC} * \text{M2}, \text{MANC} * \text{RINT}, \text{GCF}, \text{CREDITPRI})$$

The functional form is respecified in the stepwise and econometrics form to give the following:

$$\text{HDI}_t = \beta_0 + \beta_1 \text{HDI}_{t-1} + \beta_2 \text{MANC}_t + \beta_3 \text{QGOV}_t + \beta_4 \text{RINT}_t + \beta_5 \text{M2}_t + \beta_6 \text{GCF}_t + \beta_7 \text{CREDITPRI}_t + \varepsilon_t \dots 1$$

$$\text{HDI}_t = \beta_0 + \beta_1 \text{HDI}_{t-1} + \beta_2 \text{MANC}_t + \beta_3 \text{QGOV}_t + \beta_4 \text{RINT}_t + \beta_5 \text{M2}_t + \beta_6 \text{MANC}_t * \text{QGOV}_t + \beta_7 \text{GCF}_t + \beta_8 \text{CREDITPRI}_t + \varepsilon_t \dots 2$$

$$\text{HDI}_t = \beta_0 + \beta_1 \text{HDI}_{t-1} + \beta_2 \text{MANC}_t + \beta_3 \text{QGOV}_t + \beta_4 \text{RINT}_t + \beta_5 \text{M2}_t + \beta_6 \text{MANC}_t * \text{M2}_t + \beta_7 \text{GCF}_t + \beta_8 \text{CREDITPRI}_t + \varepsilon_t \dots 3$$

$$\text{HDI}_t = \beta_0 + \beta_1 \text{HDI}_{t-1} + \beta_2 \text{MANC}_t + \beta_3 \text{QGOV}_t + \beta_4 \text{RINT}_t + \beta_5 \text{M2}_t + \beta_6 \text{MANC}_t * \text{RINT}_t + \beta_7 \text{GCF}_t + \beta_8 \text{CREDITPRI}_t + \varepsilon_t \dots 4$$

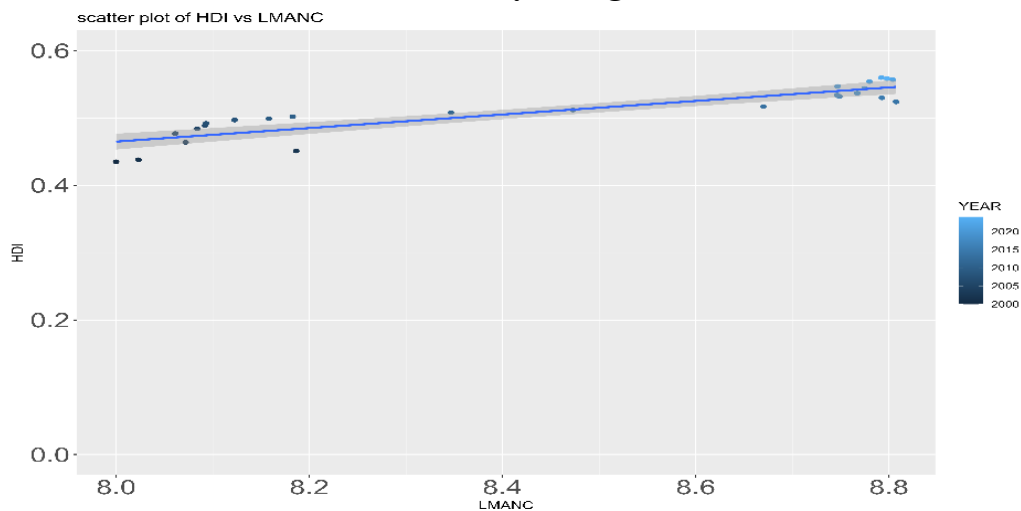
Where:

HDI	= Human Development Index (a measure for economic development)
MANC	= Manufacturing sector's contribution (Output) to GDP
M2	= Broad Money Supply
RINT	= Real Interest Rate
QGOV	= Quality Governance (Institutional variable of quality regulation and implementation)
GCF	= Gross Capital Formation (Domestic Investment)
CREDITPRI	= Bank Credit to private Sector.

The ARDL system of analysis was employed to examine equations (1-4) specified above, having subjected the dataset to preliminary tests of descriptive statistics which checks the normality of data used in this study, pairwise correlation matrix; showing the relationship among variables especially with the dependent variables, and ADF unit root test to check for stationarity of variables.

Findings

Figure 1. **Relationship between Economic Development and Manufacturing Sector Productivity in Nigeria**



Source: Author's Computation, 2026

Figure 1 shows the relationship between economic development and manufacturing sector productivity in Nigeria during the period of study. An upward trend was observed, showing a positive relationship between the pair. It can also be deduced that the influence of the manufacturing sector on economic development tend to increase overtime as more activities was evident towards the tail of the graph as the coloration tend to be less dense with time, as more dots are clustered around 2018 and 2024.

Table 1. **Augmented Dickey-Fuller Unit Root Test Results**

Variables	ADF test Statistic	ADF critical Values (5%)	Remark	Order of Integration
HDI	-10.47018	-3.456805	Stationary	I(1)
MANC	-10.18383	-3.456319	Stationary	I(0)
QGOV	-9.755379	-3.456319	Stationary	I(1)
RINT	-9.774655	-3.456319	Stationary	I(1)
M2	-11.15406	-3.456319	Stationary	I(1)
GCF	-4.123890	-3.455842	Stationary	I(0)
CREDITPRI	-11.04258	-3.456319	Stationary	I(1)

Source: Author's computation using E-views 10 (2026)

The ADF results indicate a mixture of integration orders where MANC and GCF are classified as I(0) (stationary at level), and HDI, QGOV, RINT, M2, and CREDITPRI are classified as I(1) (stationary after taking a first difference). It is a mixed order property, which makes ARDL preferable to other cointegration techniques (Johansen requires all variables I(1); Engle-Granger requires I(1) dependent variable).

Table 2. ARDL Bounds Test for Cointegration

Test Statistic	Equation I	Equation II	Equation III	Equation IV
F-statistic	2.062326	2.190112	2.019709	1.918578
K (number of regressors)	6	7	7	7
Critical values (5%):				
I(0) bound	2.45	2.32	2.32	2.32
I(1) bound	3.61	3.50	3.50	3.50

Source: Author's computation using E-views 10 (2026)

All of the F-statistics are below the I(0) lower level at 5% significance. This means that there is no long-run cointegration relationship between the variables. If there's no cointegration, manufacturing capacity, institutional quality, and monetary policy variables are not in long-run equilibrium with HDI. Instead, the link between these variables and economic development is largely short-run and dynamic—their impacts are not cumulative but rather fade away with time—into a gain of economic development.

Cointegration absence indicates that temporary measures (such as adjustment of interest rate, money supply, etc.) do not have a permanent impact on the trajectory of Nigeria's development unless they are carried out over the long haul. This is corroborated by the institutional arguments, which preach long run equilibrium relationships in Nigeria's volatile policy environment (Chang & Andreoni, 2020). In this scenario, given the bounds test results, the ARDL estimation is adopted instead of an error-correction model and the model is estimated in short-run format (conditional on lagged dependent variables).

Table 3. Combined ARDL Results (Dependent Variable: HDI)

Variables	Equation I	Equation II	Equation III	Equation IV
HDI _{t-1}	0.899132* (20.34067) [0.0000]	0.900008* (20.60508) [0.0000]	0.903806* (20.49342) [0.0000]	0.885351* (19.80969) [0.0000]
LOGMANC	0.013475** (2.215479) [0.0293]	0.021594* (2.843296) [0.0056]	0.012155 (0.867447) [0.3881]	-0.000616 (-0.199137) [0.8426]
LOGMANC _{t-1}	-0.012279** (-2.014531) [0.0470]	-0.012173** (-2.004482) [0.0482]		
QGOV	0.000507 (0.161174) [0.8723]	-0.085290 (-1.731377) [0.0870]	-0.000108 (-0.033891) [0.9730]	1.47E-05 (0.004651) [0.9963]
QGOV _{t-1}	-0.005134 (-1.623850) [0.1080]		-0.005480 (-1.739407) [0.0855]	-0.005272 (-1.693474) [0.0940]

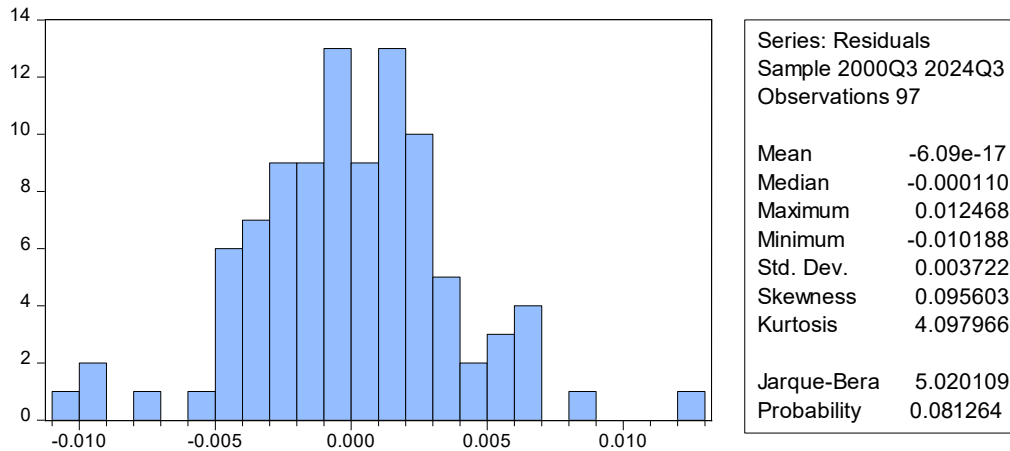
Variables	Equation I	Equation II	Equation III	Equation IV
RINT	-0.000184* (-2.844480) [0.0055]	-0.000194* (-3.013861) [0.0034]	-0.000181* (-2.831514) [0.0058]	-0.007036* (-2.999920) [0.0035]
RINT _{t-1}	0.000161** (2.428519) [0.0172]	0.000143** (2.142903) [0.0349]	0.000151** (2.256157) [0.0266]	0.005623** (2.502634) [0.0142]
LOGM2	0.019220* (4.798623) [0.0000]	0.018348* (4.589505) [0.0000]	0.012297 (0.983529) [0.3281]	0.022844* (5.447309) [0.0000]
LOGM2 _{t-1}	-0.016457* (-6.571296) [0.0000]	-0.016587* (-6.689855) [0.0000]		-0.018011* (-7.322813) [0.0000]
MANC×QGOV		0.010258 (1.742221) [0.0850]		
MANC×QGOV _{t-1}		-0.000609 (-1.616901) [0.1096]		
MANC×M2			0.000712 (0.491552) [0.6243]	
MANC×M2 _{t-1}			-0.001852* (-7.410591) [0.0000]	
MANC×RINT				0.000838* (2.916287) [0.0045]
MANC×RINT _{t-1}				-0.000670** (-2.439050) [0.0168]
LOGGCF	0.001835 (0.696009) [0.4883]	0.002252 (0.859725) [0.3923]	0.002145 (0.825982) [0.4111]	0.000378 (0.139798) [0.8891]
LOGCREDITPRI	-0.000266 (-0.093913) [0.9254]	0.000913 (0.315611) [0.7531]	-0.000508 (-0.177607) [0.8594]	-0.001397 (-0.463143) [0.6444]
Model diagnostics:				
R-squared	0.997191	0.997280	0.997214	0.997326
Adjusted R-squared	0.996836	0.996900	0.996862	0.996953
F-statistic	2807.625 [0.0000]	2627.649 [0.0000]	2830.768 [0.0000]	2672.694 [0.0000]
Durbin-Watson	2.215657	2.265187	2.275569	2.232054

*Notes: *, ** indicate statistical significance at 1% and 5% levels respectively

This study also checked the validity of the model estimated with a battery of post diagnostic tests, beginning with the normality test for residual series.

The residuals are normally distributed with the Jarque-Bera statistic value of 5.020109 (p=0.081264 > 0.05) which is used to test the normality assumption for valid inferences.

Figure 2. Histogram Normality Test



Source: Author's computation, E-views, 2026

Table 4 shows that the F-statistic (2.292352, $p=0.1072$) and the test of Obs $\times$ R-squared (5.066553, $p=0.0794$) are both greater than 0.05, which means that the null hypothesis that there is no serial correlation is not rejected. Residuals have independent distribution.

Table 4. Test for the presence of Serial Correlation

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	2.292352	Prob. F(2,20)	0.1072
Obs*R-squared	5.066553	Prob. Chi-Square(2)	0.0794

Source: Author's computation, E-views, 2026

The Breusch-Pagan-Godfrey F-statistic (0.767109, $p=0.7585$) and Obs $\times$ R-squared (18.89458, $p=0.7073$) show that residuals are homoskedastic, meaning that the variance is constant. Thus, we accept the null of no heteroscedasticity in the estimated models.

Table 5. Test for Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.767109	Prob. F(23,72)	0.7585
Obs*R-squared	18.89458	Prob. Chi-Square(23)	0.7073
Scaled explained SS	11.99925	Prob. Chi-Square(23)	0.9705

Source: Author's computation, E-views, 2026

The stability of the model was revealed through the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of the square residuals (CUSUMQ) test as depicted in fig. 3 and fig. 4 respectively.

Figure 3. Cumulative Sum of Recursive Residuals (CUSUM) Test for HDI

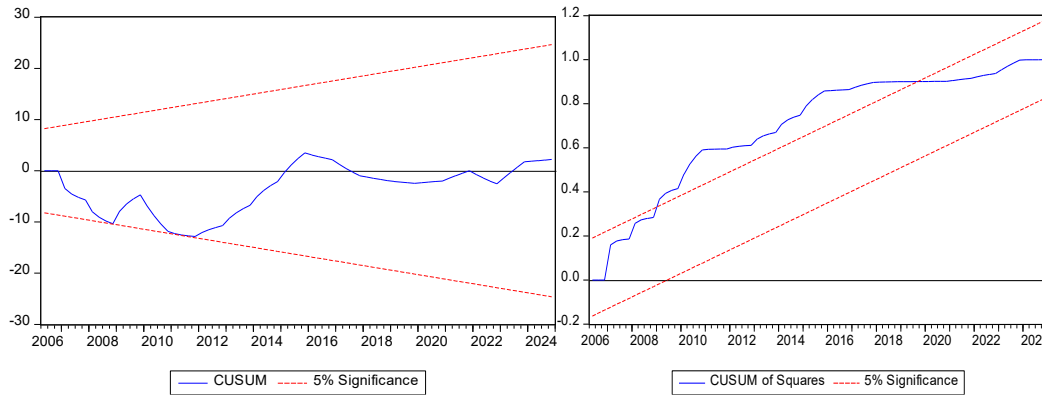


Figure 3, depicts the stability of the model, and it was observed that the blue lines are safely positioned within the dashed boundaries. With this, we affirm the stability of the model and hence, conclude that the outcome is robust and suitable for well-meaning inferences. The CUSUM and CUSUMSQ plots stay within 5% critical bounds for the entire sample period, thus verifying parameter stability. This stability in Nigeria despite multiple political transitions (2003, 2007, 2010, 2015 and 2023) implies that structural breaks are more likely to affect the level of the policy than the functional form of the manufacturing-development relationship.

In all four equations, the signs of the coefficient for HDI_{t-1} were positive and the probability values statistically significant (< 0.0001), ranging from 0.885 to 0.903. Economic mechanism: Given the case of Nigeria, with a 1% rise in the HDI over the past quarter, the current HDI is approximately 0.89% higher, *ceteris paribus*. This strong intertemporal dependence suggests a strong path-dependency for development; countries that historically have higher development systematically have higher development in later periods. In what ways is this helpful to Rostow? Rostow (1960) proposed the idea of the Stages of Economic Growth and each stage is qualitatively different from the rest, and the successes of each stage set the conditions for the subsequent stage. We measure this stage transition mechanism and find that about 89% of Nigeria's development level remains constant from quarter to quarter, which suggests a slow, but stable, stage transition. Policy implications imply that temporary development shocks (such as oil price reductions, conflict episodes) have long lasting impacts, and sustained development interventions (decade-long manufacturing promotion) have cumulative impact gains that are larger than the gains of the intervention itself.

The second finding relates to manufacturing capacity and development (Rostow's take-off hypothesis). The MANC has a positive and significant relationship with HDI, with the coefficient of 0.0135 in equation (I) and 0.0216 in equation (II) at 5% level of significance. When included in the equations, however, the monetary policy interaction terms yield insignificant or even negative coefficient for the two equations (III and IV). An increase in manufacturing value added by 1 percent of GDP will add 0.014-0.022 percent to the HDI, without monetary policy interaction. This effect size may appear small, but is economically significant because the share of manufacturing in the Nigerian economy averaged 8.5% of GDP in the sample period corresponding to a 10% relative increase in manufacturing would increase the HDI by about 0.14-0.22% which puts the country from 0.535 to 0.536-0.5362. Why do the significance of the manufacturing drop in Equations III and IV? One of the difficulties of using MANC alone is that it does not explain variation due to $MANC \times M2$ or $MANC \times RINT$ interaction. Variations due to $MANC \times M2$ and $MANC \times RINT$ interaction

is absorbed by the inclusion of these interaction terms. This means that monetary policy conditions affect the outcome of manufacturing growth in terms of development. In particular, if money supply grows (Equation III) or interest rates are low (Equation IV), the marginal effect of manufacturing on development does not work directly but through monetary policy transmission mechanisms.

The results corroborate those of Kaya (2010), Okezie, Nwosu and Marcus (2017), and Okeoma, Nwaobilor and Amaechi (2022) who found that the impacts of manufacturing on development are positive. But we slightly fly in the face of Bennett, Anyanwu and Kalu (2015) and Oniyide and Ogunjinmi (2021) who reported insignificant manufacturing effects. Annual OLS with no monetary policy interactions were used by Bennett and Oniyide and we have done the same in the quarterly ARDL with the interactions; When the monetary policy conditions are bad (high interest rates, tight money), the manufacturing effects are not statistically detectable.

The conclusion of the third finding is that institutional quality non-significant (H_3 rejected). The p-values of the equations indicate that the variables QGOV and its interactions ($MANC \times QGOV$) are not statistically significant at the conventional level ($p > 0.085$). The interpretation of economic mechanism: In Nigeria, regulatory quality has no significant effect on the relationship between manufacturing and development. This is a null finding of significance.

We suggest four possible mechanisms that are in line with the work of institutional economics. There is an implementation gap (Chang and Andreoni, 2020), which separates policy design from policy implementation. Formal policy implementation indices, as captured by the World Bank CPIA rating, are low for Nigeria (2.8/6 in 2023) indicating that policy implementation is not correlated with effective governance. Regulatory capture in developing economies takes manufacturing productivity gains away from development and towards rent-seeking, as described by Santiago and Zagato (2024). Nigeria's corruption perception index (CPI) score for 2023 was 25/100, suggesting systemic corruption which can hinder formal regulatory gains.

Furthermore, the authors Cherif and Hasanov (2019) found that regulation matters more than regulation quality scores, and that credible and stable regulation is more important. Across the five presidency periods in our sample (2000-2024), Nigeria's regulatory landscape underwent significant transformations, which increased uncertainty and discouraged long-term manufacturing investments, even when regulations were evaluated at a specific time. In terms of informal sector dominance, about 65% of manufacturing activities in Nigeria are informal and that is outside any formal regulatory structure (UNDP, 2023). Thus, for most manufacturing activity, formal regulatory quality measures may be irrelevant. Hence, institutional quality is not enough, Nigeria needs implementation mechanism such as monitoring, enforcement, anti-corruption agencies with operational independence and regulatory stability (stability of policies across the administrations).

The study found monetary policy heterogeneity ($M2$ vs. $RINT$). When the interaction term $MANC \times M2$ is not included in the equation, broad money supply ($M2$) is significant across all four equations, Equations I, II and IV, with coefficients ranging from 0.018 to 0.023 and $p < 0.01$. On the other hand, the real interest rates ($RINT$) are always significant in all the equations (-0.00018 to -0.00704 in the current period; positive in the lags). In absence of

interaction terms, every 1% increase in M2 (% of GDP) leads to a change in HDI of 0.018-0.023%. This contributes to the monetarist transmission: expansionary monetary policy boosts aggregate demand, raises manufacturing output and jobs, which boosts HDI components (income from work, health from increased access to health care and education from increased investment in education). Why is there little deal with M2 if it is involved with manufacturing? Since development is affected by money supply via the manufacturing channel, the $MANC \times M2$ interaction term in Equation III serves as a proxy for the conditional effect of money supply on development. The current period coefficient (0.000712, $p=0.6243$) highlights the fact that development contribution of manufacturing is not specific to M2, as manufacturing is also affected by M2 by other channels such as consumption, services and construction. This result is an extension to Popov and Steininger (2023) who observed that the monetary policy transmission effect is heterogeneous by sector, and we demonstrate that M2 transmission is missing manufacturing and goes through other sectors in Nigeria.

The large negative value of the coefficient of current period RINT' (-0.000184 to -0.007036) shows that a 1 percentage point increase in real interest rates is associated with a decrease in HDI of 0.0002-0.0070%. Why negative? A higher interest rate makes costs of manufacturing borrowing higher, capital equipment investment lower, the cost of working capital higher (especially important for import-dependent manufacturers in currency appreciation), and decreases the availability of consumer credit for manufactured goods. Importantly, the positive lagged coefficients on RINT' (0.000143-0.005623) indicate that the contemporaneous effect is partially offset by the lagged effect, which is called intertemporal reversal. Mechanism explanation: If the CBN increases interest rates, manufacturing contracts will happen immediately (negative current coefficient). But high rates also bring foreign portfolio investment, which helps the naira to appreciate and lowers the cost of imported inputs for manufacturers one quarter later (positive lagged coefficient). The two stages of adjustment, contraction and imported input cost relief, is specific to an import dependent manufacturing economy like Nigeria.

The most policy-relevant result is the significant positive coefficient (0.000838, $p=0.0045$) for the $MANC \times RINT'$ interaction (Equation IV), suggesting that the negative impact of interest rates on development decreases with an increase in the manufacturing share. Mathematically, $\partial HDI / \partial RINT' = \beta_4 + \beta_6 \times MANC = -0.007036 + 0.000838 \times MANC$. The net effect of interest rates on development turns positive when MANC is greater than 8.4% of GDP. The manufacturing sector is close to this level, averaging 8.5% of the economy's total value-added during 2000-2024. Policy implication: If the manufacturing share is more than 8.4% then development effect of interest rate hikes will be minimal, possibly positive. This discovery has positive implications for the promotion of manufacturing through interest rate policy.

Conclusion

In this study, the researchers used ARDL analysis on quarterly data to investigate the moderating effect of institutional quality and monetary policy on the relationship between manufacturing capacity and economic development in Nigeria from 2000Q1-2024Q4. There are four main conclusions to be drawn: First, Nigeria's development is characterized by high intertemporal dependence (elasticity ≈ 0.89), thus validating the stage transition hypothesis of Rostow. Growth is a function of past growth, meaning that temporary shocks have lasting

impacts and that continuing interventions have lasting impacts. Second, there is a positive effect of manufacturing capacity on development, subject to monetary policy. When added to the model, interactions between monetary policy and manufacturing create a loss of manufacturing significance, suggesting that the conditions of policy can determine whether manufacturing growth leads to development benefits. Third, monetary policy transmission is heterogeneous: Broad money supply influences development through non-manufacturing channels, real interest rates have a two-stage adjustment process (immediate contraction, followed by imported input cost relief). Most critically, the negative development impact of interest rates is reversed once the share of manufacturing in GDP is higher than 8.4% which Nigeria finds herself in the middle of. Fourth, the relationship between manufacturing and development remains largely unaltered by institutional quality (regulatory governance), indicating that the issues are not of policy design but of implementation gaps, corruption, regulatory volatility, and dominance of the informal sector.

There are three limitations to admit. First, the quarterly data on HDI and regulatory quality had to be interpolated from the yearly observations. Quarterly variation patterns are only estimated, but quadratic match-sum preserves annual averages. Our findings could be validated in future studies using more frequent governance measures, such as monthly surveys of business climate. Second, the bounds test showed that there was no long-run cointegration, so we are only concerned with short-run dynamics. There may be structural changes in Nigeria and unstable policy regimes which may hinder the existence of stable LR equilibrium relationships, a condition itself (which may be policy-relevant) but which limits the ability to make permanent predictions. Third, our institutional quality measure (regulatory quality index) cannot reflect the informal sector, corruption occurrence or the effective implementation of the institutions. Mechanisms related to null institutional findings may be shed light through the use of complementary qualitative techniques (expert surveys, case studies).

In terms of policy, this study provides evidence for the CBN to adopt tiered interest rate for the manufacturing sector, whilst setting the standard interest rate for other sectors based on the 8.4% threshold for manufacturing sector. This would take the effective manufacturing share over the limit and make increasing interest rates development-positive. The two-stage adjustment mechanism (the negative current and the positive lagged effects) suggests that the more often interest rates change the more counterproductive it will be. The CBN ought to take a longer-term perspective in setting policy (6-9 months between changes) so as to give positive lagged effects time to show. Furthermore, M2's side role in manufacturing indicates that any expansionary monetary policy will not target manufacturing per se. To steer liquidity towards manufacturing, the CBN should adopt a policy of M2 growth and a policy of targeted credit growth (sectoral reserve requirements, manufacturing credit growth targets).

For industrial policymakers (Ministry of Industry, Trade and Investment, policy efforts should move from regulatory design towards implementing mechanisms in the context of null institutional quality effects: establish manufacturing ombudsman with enforcement powers, develop automated regulatory compliance monitoring, and adopt a performance-based budgeting for industrial agencies. Also, there is strong intertemporal dependence, indicating that policy reversals from administration to administration are quite costly. We call for laws to ensure that manufacturing promotion policies are entrenched (must be repealed by a super majority) and for the creation of an independent National Manufacturing Council,

whose members are appointed for fixed terms which last several elections. Regarding fiscal authorities (Ministry of Finance), monetary policy is not enough to stimulate manufacturing growth. Increase the effectiveness of monetary policy transmission by introducing manufacturing investment tax credits (effective tax rate reduced from 30% to 15% for manufacturing companies with 5-years of operation) and accelerated depreciation schedules (3-years write-off for manufacturing equipment).

This study contributes to the literature in three ways. On the theoretical level it is an extension of Rostow's stage theory, making it quantitative by providing the numbers for intertemporal elasticity of development and making it possible to grasp the numerical magnitudes of the transitions between the stages. Methodologically, it illustrates an application of ARDL to mixed-order integration in the African context where the stationarity assumptions are often not met. In practice, it establishes the threshold of manufacturing share (8.4%) for Nigeria to achieve the effectiveness of interest rate policy, a parameter which was hitherto not mentioned in policy debates.

References

- Adofu, I., Taiga, U. U., & Tijani, Y. (2015). Manufacturing sector and economic growth in Nigeria (1990–2013). *Donnish Journal of Economics and International Finance*, 1(1), 1–6.
- Aiyedogbon, J. O., & Anyanwu, S. O. (2015). Macroeconomic determinants of industrial development in Nigeria. *Nile Journal of Business and Economics*, 1(1), 37–46.
- Amoah, C., & Jehu-Appiah, J. (2022). Factors driving industrialization in Africa: A panel two-stage least square approach. *Modern Economy*, 13(2), 144–158. <https://doi.org/10.4236/me.2022.132009>
- Aransiola, I. S., Olasupo, F. S., Ogunwole, O. C., Abalaba, P. B., & Aderemi, A. T. (2022). Determinants of industrial development in developing countries: The case of Nigeria. *Acta Universitatis Danubius (Economica)*, 18(6), 39–52.
- Asiagwu, H., Utalor, C., & Anaele, S. C. (2021). Monetary policy and industrial growth in Nigeria. *Journal of Emerging Trends in Management Sciences and Entrepreneurship*, 3(1), 154–166.
- Bennett, K. O., Anyanwu, U. N., & Kalu, A. O. U. (2015). The effect of industrial development on economic growth (An empirical evidence in Nigeria 1973–2013). *European Journal of Business and Management*, 7(13), 160–170.
- Central Bank of Nigeria. (2023). *Statistical bulletin 2022*. CBN Press.
- Chang, H.-J., & Andreoni, A. (2020). Industrial policy in the 21st century. *Development and Change*, 51(2), 324–351. <https://doi.org/10.1111/dech.12570>
- Cherif, R., & Hasanov, F. (2019). *The return of the policy that shall not be named: Principles of industrial policy* (IMF Working Paper No. 19/74). International Monetary Fund.
- Christopher, N. E., & Uduak, M. E. (2022). Monetary policy and industrial sector performance in Nigeria: Measuring the extended impact on the economy. *Journal of Applied Financial Econometrics*, 3(1), 97–131. <https://doi.org/10.47509/JAFE.2022.v03i01.06>
- Edeh, S. U., & Okia, R. (2024). Fiscal policy and manufacturing sector output in Nigeria (1981–2021). *International Journal of Public Administration*, 3(2), 1–18.

- Ezeanyej, C., Usifoh, K. S., Umeuzuegbu, U., & Ejefobihi, U. F. (2023). Industrial sector growth and economic performance in Nigeria. *Journal of Policy and Development Studies*, 13(4), 1–19. <https://doi.org/10.4314/jpds.v13i4.1>
- Friedman, M. (1968). The role of monetary policy. *American Economic Review*, 58(1), 1–17.
- Igbinedion, S. O., & Ogbeide, F. I. (2016). Monetary policy and manufacturing capacity utilization: Further evidence from Nigeria. *South-Eastern Europe Journal of Economics*, 14(2), 159–174.
- Ighoroje, E. J., & Osevwe-Okoroyibo, E. E. (2023). An overview of government expenditure and the manufacturing sector output in Nigeria. *Journal of Emerging Trends in Management Sciences and Entrepreneurship*, 5(1), 142–153.
- Kaya, Y. (2010). Globalization and industrialization in 64 developing countries, 1980–2003. *Social Forces*, 88(3), 1153–1182. <https://doi.org/10.1353/sof.0.0300>
- Keji, A. S. (2023). Industrial output growth and foreign direct investment in Nigeria. *Future Business Journal*, 9(58), 1–14. <https://doi.org/10.1186/s43093-023-00225-0>
- Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *Manchester School of Economic and Social Studies*, 22(2), 139–191.
- Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 21(1), 3–42. [https://doi.org/10.1016/0304-3932\(88\)90168-7](https://doi.org/10.1016/0304-3932(88)90168-7)
- Naudé, W., Szirmai, A., & Lavopa, A. (2013). *Industrialization lessons from BRICS: A comparative analysis* (IZA Discussion Paper No. 7543). Institute of Labor Economics.
- Ndiaya, C., & Ly, K. (2018). Role of industrialization on economic growth: The experience of Senegal (1960–2017). *American Journal of Industrial and Business Management*, 8(10), 2072–2085. <https://doi.org/10.4236/ajibm.2018.810138>
- Obichukwu, P. O. (2013). Industrial capacity utilization and economic growth in Nigeria: A vector autoregressive analysis. *Journal of Economics and Sustainable Development*, 4(7), 108–118.
- Okeoma, T. F., Nwaobilor, N. C., & Amaechi, U. G. (2022). Impact of manufacturing capacity utilization on the Nigerian economy. *Journal of Energy, Technology and Environment*, 4(4), 76–86. <https://doi.org/10.5281/zenodo.7446344>
- Okezie, A. C., Nwosu, C. A., & Marcus, S. N. (2017). Industrialization and economic growth in Nigeria. *Journal of Economics and Finance*, 1(1), 1–20.
- Oniyide, F. V., & Ogunjinmi, O. O. (2021). Effect of manufacturing capacity utilization on economic growth: Empirical evidence of Nigeria. *International Journal of Research and Scientific Innovation*, 8(5), 39–48.
- Ozuzu, C. A., & Isukul, S. A. (2021). Government expenditure and its effect on the industrial sector in Nigeria. *Asian Journal of Economics, Business and Accounting*, 21(7), 81–92. <https://doi.org/10.9734/ajeba/2021/v21i730395>
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289–326. <https://doi.org/10.1002/jae.616>
- Popov, A., & Steininger, L. (2023). *Monetary policy and local industry structure* (European Central Bank Working Paper Series No. 2778). European Central Bank. <https://doi.org/10.2866/325239>

- Roller, L., & Sickles, R. (2000). Capacity and product market competition: Measuring market in a puppy dog industry. *International Journal of Industrial Organization*, 18(6), 845–865. [https://doi.org/10.1016/S0167-7187\(98\)00046-5](https://doi.org/10.1016/S0167-7187(98)00046-5)
- Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94(5), 1002–1037. <https://doi.org/10.1086/261420>
- Rostow, W. W. (1960). *The stages of economic growth: A non-communist manifesto*. Cambridge University Press.
- Santiago, F., & Zagato, L. (2024). *Reflections on policy capacity development for industrial policy making in developing countries* (UNIDO Working Paper Series 1/2024). United Nations Industrial Development Organization.
- Singh, A. K., & Kumar, S. (2021). Assessing the performance and factors affecting industrial development in Indian states: An empirical analysis. *Journal of Social Economics Research*, 8(2), 135–154. <https://doi.org/10.18488/journal.35.2021.82.135.154>
- Szirmai, A. (2009). *Industrialization as an engine of growth in developing countries* (UNU-MERIT Working Paper 2009-010). United Nations University.
- Szirmai, A. (2012). Industrialisation as an engine of growth in developing countries, 1950–2005. *Structural Change and Economic Dynamics*, 23(4), 406–420. <https://doi.org/10.1016/j.strueco.2011.01.005>
- Turhan, M. (2018). The effect of capacity utilization on economic growth in industrial enterprises. *Journal of Business Management and Economic Research*, 2(11), 38–47. <https://doi.org/10.29226/TR1001.2018.78>
- Ubi, P. S., Effiom, L., & Eyo, E. I. (2012). Monetary policy and industrialization in an emerging open economy: Lessons from Nigeria. *International Journal of Academic Research in Business and Social Sciences*, 2(8), 270–288.
- Uju, E. A., & Ugochukwu, P. O. (2021). Effect of monetary policy on industrial growth in Nigeria. *International Journal of Entrepreneurship and Business Innovation*, 4(1), 47–60. <https://doi.org/10.52589/IJEBI1Z4IYBYE>
- United Nations Development Programme. (2023). *Human Development Report 2021/2022: Uncertain times, unsettled lives*. UNDP.
- United Nations Industrial Development Organization. (2020). *How industrial development matters to the well-being of the population: Some statistical evidence*. UNIDO.
- Vinals, J., & Valles, J. (2007). *Credit and monetary policy: An empirical assessment* (Bank of Spain Working Paper No. 0725). Banco de España.
- World Bank. (2024). *World Development Indicators 2024*. World Bank Publications.

