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Moderating Effect of Monetary Policy and Financial Development on Manufacturing Sector Performance

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Abstract
The purpose of this study is to examine the moderating impact of monetary policy and financial development on manufacturing sector performance in Nigeria from 1981 to 2021. The study employed annual time series data collected from the World Bank's Development Indicators. The data was analysed using the Autoregressive Distributed Lag estimator. The study found that monetary policy and financial development have significantly impacted manufacturing sector performance positively. Also, the interaction between monetary policy and financial development drives the performance of the manufacturing sector by lubricating access to investible funds in the sector through expansive monetary policy, stable inflation, and moderate interest rates. The practical implications of the study are that manufacturing sector performance is enhanced by expansive monetary policy and financial sector development. Moreover, monetary policy and financial development are complementary in their impact on the manufacturing sector. The main conclusion and its contribution are that financial development effectively moderates the impact of monetary policy on manufacturing in Nigeria. Thus, an expansive monetary policy and financial development strategies through efficient credit creation to the private sector would be the panacea for the dwindling performance of manufacturing in Nigeria.
Keywords: Monetary Policy; Financial Development; Manufacturing Sector Output; Autoregressive Distributed Lag; Moderating Effect
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1. Introduction

Manufacturing is important for economic growth and welfare since it improves export capacity and global competitiveness (Rauf et al., 2023). Without manufacturing, the economic growth rate will be slow, paid jobs will be fewer, there will be less innovation, limited consumer choices, and countries will have huge trade deficits. To support the foregoing claims, manufacturing contributes 17% to global gross domestic product (GDP), propels demand in other sectors of the economy, provides 13% of global employment and accounts for a sizeable proportion of global trade (World Manufacturing Report, 2022). At the same time, economic factors and policies can significantly affect the operations of manufacturing firms in the short and long run. So, understanding how macroeconomic policies will impact the future of the manufacturing sector is a crucial exercise for firms and governments trying to respond positively to competition and evolving consumers' needs in this new era.

As the new era witnesses a paradigm shift from globalization to slowbalisation (the slowdown in the integration process of the global economy), with rising inflation rate, protectionism as re-emerged, as countries reinforce macroeconomic and financial policies that could make their manufacturing sector resilient in the face of global economic fragility. Therefore, given the multifaceted policy instruments that governments adopt today, they could impact the manufacturing sector in a variety of ways, especially now that significant disruptions in the global economy remains unprecedented (World Manufacturing Report, 2022).

The National Bureau of Statistics (2022) reports on the Nigerian manufacturing sector aligns with the global disruptions with obvious reduction in the performance of the sector. Emphatically, the Nigerian manufacturing sector in Q2-2022 recorded nominal growth of 5.21%, which was 33.12% point lower than the corresponding period in 2021. Also, the real growth in the sector for Q2-2022 was 3% lower than 2021 figures. Unfortunately, the growth rate of the manufacturing sector on a quarter-on-quarter basis declined to -15.47%, and its contribution to real GDP declined by 8.65% from the corresponding period of 2021.

To provide panacea to the crumbling manufacturing sector performance in Nigeria, recent literatures have attempted an analysis of the manufacturing sector performance from several perspectives. Lawal et al (2022) explained how macroeconomic variables influence the performance of manufacturing activities. Adebanjo et al (2019) and Ayobami (2019) linked the manufacturing sector performance to the exchange rate fluctuations. Also, Oladipo et al (2019) argued that the manufacturing sector is affected by the government taxes, while Orji and Ojadi (2021) analysed the performance of the sector in the face of the impact of Covid-19 pandemic. Moreover, the manufacturing sector has been further linked with the inflows of Foreign Direct Investment (Eze et al., 2019), electricity consumption and access (Asaleye et al., 2021; Edet et al., 2022), and the strategy adoption (Iheanachor, 2022).

Despite the volume of recent literature on the performance of the Nigerian manufacturing sector, the moderating roles of financial development and monetary policy in shaping the manufacturing sector have been ignored. Discretionary policies such as monetary, fiscal, and financial development policies are strategic determinants of business environment, with attendance influence on the performance of the manufacturing sector. In Nwankwo et al (2022), the sole influence of monetary policy on manufacturing sector growth was justified, while neglecting the impact of financial development occasioned by financial policies.

Therefore, the objectives of the study are to (i) examine the impact of monetary policy on manufacturing sector performance; (ii) analyse the impact of financial sector development on the Nigerian manufacturing industry; and (iii) determine the moderating effect of monetary policy and financial development on manufacturing sector performance.

The remaining part of this study is structured; thus, Part 2 is Literature Review; Part 3 is methodology; Part 4 covers Results and Discussions; and Part 5 concludes the study with policy direction.

2. Theory and Review of Related Literature

Our study builds on the Keynesian Theory and the Endogenous Growth Model. The Keynesian Theory of Money provides a framework for the relationship between monetary policy and real sector output while the Endogenous Growth Model underpins the influence of financial development on the performance of the manufacturing sector. More so, the Keynesian Theory proposes that an expansive monetary policy could promote investment, lower interest rates, and culminate in manufacturing sector growth (Keynes, 1931; Nwandu, 2016; Shaikh et al., 2022). The Endogenous Growth Model postulates that financial development can boost manufacturing output through the effective allocation of savings to investment (Romer, 1994; Appiah et al., 2023).

Consequently, the study reviewed three strands of literature. The first strand examined whether monetary policy improves or inhibits manufacturing sector performance. The second strand analysed if financial development has a positive or a negative impact on manufacturing sector growth. The third strand presented the causal linkage amongst monetary policy, financial development, and manufacturing sector growth.

On the first strand of the literature, our study's review showed a mixed findings as some established that monetary policy as significant positive impact on the performance of the manufacturing sector of the economy (Aslam & Awan, 2018; Kamaan & Nyamongo, 2014; Sean, 2019; Abubakar & Lawal, 2022; Kutu, 2017; Onakoya & Johnson, 2017). The views of these authors are that monetary policy boost manufacturing sector output through the channels of money supply, interest rates, investment, industrial output, and economic growth, which culminate in manufacturing sector growth. Their argument lends credence to the Keynesian theory of money. However, other authors are in opposition to this view. They claimed that monetary policy has adversely affected the manufacturing sector (Imoughele & Ismaila, 2014; Ezeaku et al., 2018; Shobande, 2019). These studies argued that monetary policy instrument has been rendered ineffective by contrasting fiscal policy and weak institutions (Mihal, 2009; Qamruzzaman, 2022). Thus, it is obvious that the literature is far from consensus on the impact that monetary policy has on the manufacturing sector of the economy. Thus, the first research question "how is the manufacturing sector in Nigeria influenced by monetary policy?"

On the second strand of empirical evidence, our findings portray existing contradictions on the actual impact of financial development on the manufacturing sector across the globe. While some scholars are of the opinion that financial development improves manufacturing sector growth through the link of economic growth (Amalu et al., 2021; Campbell & Asaleye, 2016; Guru & Yadav, 2019; Santana, 2020), others reported otherwise that financial development inhibits the rate of growth of the manufacturing sector (Udoh & Ogbuagu, 2012; Mesagan et al., 2018; Aminu et al., 2019; Afolabi & Adewumi, 2022). The promoters of the positive effect of financial development on manufacturing sector growth in theoretically aligned to the Romer endogenous growth theory, while the opposers, claimed that financial development does not spur manufacturing sector performance due to lower level of financial intermediation and weak institutions (Aminu et al., 2019).

Our study extends the literature by ascertaining the moderating effect of financial development and monetary policy on manufacturing sector performance using the autoregressive distributed lag model built on the Romer endogenous growth theory and the Keynesian theory of money as espoused in the theoretical review.

3. Methodology

Model Specification

The study specified its model based on the tenets of Romer endogenous growth model augmented by the Keynesian theory of money.

Theoretically, the Cob-Douglas production function use employed to express the manufacturing sector growth model, with the assumption of a constant return to scale as presented in equation 1.

$$Y = AK^{\alpha}L^{1-\alpha} \quad 1$$

In this theoretical model, Y depicts the growth in manufacturing sector output, A is the efficiency parameter due to technology adoption, K represents the stock of human capital and L is the labour. Theoretically,

manufacturing sector performance is determined by the level of capital and labour stocks. Interestingly, this study adapted the models of earlier scholars (Edet et al., 2022; Santana, 2020; Shobande, 2019) on the impact of monetary policy and financial development on manufacturing sector performance. However, we departed from their studies by interacting monetary policy variables with financial development indicator to establish how financial development moderates the impact of monetary policy on manufacturing sector performance, the first in the literature.

$$MSP_t = \varphi_0 + \varphi_1 MTP_t + \varphi_2 FSD_t + \varphi_3 MTP * FSD_t + \varphi_4 IFR_t + \varphi_5 ITR_t + \varphi_6 ECP_t + \varepsilon_t \quad 2$$

Model 2 addresses objectives i to iii; where φ_1 is the impact of monetary policy on manufacturing sector output, with $(\varphi_1 > 0)$ a priori expecation ; φ_2 depicts the effect of financial sector development on manufacturing sector output, with $(\varphi_2 > 0)$ theoretical expectation. φ_3 represents the moderating effect of monetary policy and financial development on manufacturing growth. Theoretically, if $\varphi_3 > 0$, the moderating effect is complementary; but if $\varphi_3 < 0$, the moderating effect is substitute. More so, φ_4, φ_5, and φ_6 are the direct effects of the control variables such as inflation rate, interest rate and energy consumption.

Data

The study collected annual time series data that spanned 41 years from 1981 to 2021 for Nigeria. The data included broad money supply used to proxy monetary policy, credit to private sector as a measure of financial sector development, the proportion of manufacturing output to GDP as indicator of manufacturing sector performance as well other control variables. The data were collected from the World Bank development indicators (WDI), 2022 data bank.

4. Results and Discussion of Findings

The study presents empirical results and discusses the findings of the descriptive analysis, correlation test, unit root estimates and the autoregressive distributed modelling coefficients of the moderating models.

Table 1: Summary of Descriptive Statistics

Variable	Mean	Std. Dev.	Skewness	Kurtosis	JB	P-Value
MSP	14.32	5.07	-0.03	1.41	4.33	0.1150
MTP	8.72	1.27	1.35	3.57	13.10	0.0010
FSD	9.39	3.56	1.04	3.62	8.04	0.0180
IFR	18.95	16.66	1.85	5.31	32.58	0.0000
ITR	17.45	4.81	0.32	3.65	1.41	0.4940
ECP	47.16	7.85	-0.51	2.49	1.72	0.4220

Source: Authors computation using World Bank Data,2022

The descriptive statistics of the study presented in Table 1 shows the mean values of MSP of 14.32, which implies that on the average, the Nigerian manufacturing sector has contributed 14.32% to national output between 1981 and 2021. For the same period, broad money supply stood at an average of 8.72 trillion Naira, with a corresponding 9.33 trillion Naira average credit to the private sector. Meanwhile, the inflation rate, interest rate and energy consumption rate recorded an average of 18.95%, 17.45% and 47.16% respectively. The standard deviation of the distribution indicates the degree of variation in the observations about the average value. The estimates reveal that inflation rate has the highest level of variation at 16.66%, while broad money supply has the least spread at 1.27 standard deviation(sd). Manufacturing sector degree of spread is 5.07sd while financial sector development, interest rate and energy consumption have narrow variabilities of 3.56sd, 4.81sd and 7.85sd respectively. The combination of the coefficient of skewness, kurtosis and Jarque-Bera (JB) statistics reveal that some of the variables (MSP, ITR, ECP) are approximately normally distributed with p-values>0.05, while other variables (MTP, FSD, IFR) are far from the expected normality condition as their p-values<0.05. Thus, further tests for the existence of perfect collinearity and bounds test for long run nexus are justified.

The test for perfect collinearity using the Pearson's Product Moment as presented in Table 2 depicts the absence of a perfect correlation among the variables. This is a pointer to the appropriateness of the variables selected for the model. The result supports the notion that the models are unlikely to have multicollinearity.

Table 2: Correlation Matrix

Variable	MSP	MTP	FSD	IFR	ITR	ECP
MSP	1.000	-0.786	0.565	0.492	-0.718	-0.467
MTP		1.000	0.786	-0.276	-0.674	0.554
FSD			1.000	0.696	-0.316	-0.538
IFR				1.000	-0.721	0.461
ITR					1.000	-0.435
ECP						1.000

Source: Authors computation using World Bank Data, 2022

The correlation matrix reveals further that the relationship between monetary policy and manufacturing sector performance appears to be inverse, while a positive relationship seems to exist between financial sector development and manufacturing sector performance for the period investigated by the study. More so, while inflation appears as a positive driver of manufacturing sector performance, both interest rate and energy consumption rate seem to bear an indirect relationship with the performance of the Nigerian manufacturing sector. From Table 3, the independent variables were analysed on manufacturing sector performance to ascertain if a long-term relationship exists. The value of F-statistic 6.10, is greater than both the upper and lower bounds of 3.00 and 2.00 respectively, shows that manufacturing sector performance has a cointegrating relationship with monetary policy, financial sector development, inflation rate, interest rate and energy consumption rate in Nigeria.

Table 3: F-Bounds Test for Cointegrating Relationship

DV	F-statistic	Lower Bound	Upper Bound
MSP	6.10	2.00	3.00

Source: Authors computation using World Bank Data

Table 4: ARDL Estimates for Short Run and Long Run impact.

Short run estimates			Long run estimates	
Variable	**Coefficient**	**P-value**	**Coefficient**	**P-value**
MSP (-1)	0.356	0.016	NA	NA
MTP	9.571	0.0026	2.631	0.0018
FSD	0.798	0.0012	0.697	0.0056
MTP*FSD	5.916	0.0043	1.388	0.0001
IFR	-0.045	0.0002	0.578	0.0911
ITR	-0.08	0.0056	-0.131	0.839
ECP	0.754	0.0013	0.302	0.5498
ECM (-1)	-0.873	0.0001	NA	NA
Adjusted R-squared		0.839		

Source: Authors computation using World Bank Data, 2022; NA = not applicable

To address the objectives of the study, an empirical data analysis of model 2 was carried out using the autoregressive distributed lag (ARDL) estimation technique. The ARDL was chosen to analyse the data because it produces unbiased and efficient estimates simultaneously for the short run and long run impacts as justified in earlier studies (Mahmood et al., 2017; Ihenetu, 2021).

For the first objective, in Table 4, the result reveals that monetary policy has a positive and significant impact on manufacturing sector performance in Nigeria, which implies that broad money supply appears to spur the performance of the Nigerian manufacturing sector. Specifically, in the short run, the coefficient of monetary policy on manufacturing sector is 9.571 and in the long run, it is 2.631, which means that for every percent increase/decrease in broad money supply, manufacturing sector out grows/shrinks by 9.57% and 2.63% respectively in the short run and long run. It implies that expansive monetary policy is good for the manufacturing sector as access to investible funds could increase leading to growth in the sector. On the contrary, contractionary monetary policy seems to inhibit manufacturing sector performance by making investible funds scarce and possibly leading to higher cost of borrowing, which could reduce the growth potentials of manufacturing. Thus, our empirical position is that monetary policy is a driver of manufacturing sector growth, which aligns to earlier studies (Aslam & Awan, 2018; Kamaan & Nyamongo, 2014; Sean, 2019; Abubakar & Lawal, 2022; Kutu, 2017; Onakoya & Johnson, 2017) a confirmation of the Keynesians' theory of money. However, our finding refutes the scholarly views of other studies (Imoughele & Ismaila, 2014; Ezeaku et al., 2018; Shobande, 2019) that posited an adverse effect of monetary policy on manufacturing sector performance.

More so, the ARDL estimates for the second objective of the study show that financial development is a significant determinant of manufacturing sector performance in Nigeria in the short run and the long run. The coefficients of 0.798 and 0.697 with associated probabilities of 0.0012 and 0.0056 respectively, indicate that manufacturing sector performance is positively impacted by the level of financial development in Nigeria. The findings are justified by the fact that robust financial sector development provide the financial fluids that greases the wheel of the manufacturing sector, which aligns with Romer growth theory and earlier scholars such as (Amalu et al., 2021; Campbell & Asaleye, 2016; Guru & Yadav, 2019; Santana, 2020), and disagrees with (Udoh & Ogbuagu, 2012; Mesagan et al., 2018; Aminu et al., 2019; Afolabi & Adewumi, 2022) who are of the view that financial development is an impediment to the growth of the Nigerian manufacturing sector.

To attain the third objective, we interacted monetary policy and financial development (MTP*FSD) and the estimates of 5.916 ($p<0.05$) and 1.388($p<0.05$) indicate that the moderating effect of monetary policy and financial sector development is positive and significant. The finding implies that monetary policy and financial development are complementary in enhancing manufacturing sector performance in Nigeria. In addition, the complementarity

of their moderating effects is a testament that financial development positively moderates the impact of monetary policy on manufacturing, thus, a simultaneous expansive monetary policy and financial development are sine qua non for optimality in the performance of the Nigerian manufacturing sector.

Table 5: Post estimation Results

statistic	Autocorrelation test Breusch Godfrey	Heteroscedasticity test Breusch Pagan	Linearity test Ramsey RESET
F-Statistic	0.812	2.456	3.711
p-values	0.3204	0.3246	0.217

Source: Authors computation using World Bank Data

To valid the findings of this study, we conducted post estimation tests to diagnose the presence of autocorrelation and heteroscedasticity, and the absence of linearity and normality in the estimates. The result of the Breusch Godfrey test for serial correlation (statistic of 0.812; $p>0.05$) and the Breusch Pagan test for heteroscedasticity (statistic of 2.456; $p>0.05$) confirm that the estimated model is unlikely to be affected by the problem of autocorrelation, and the model is homoscedastic. Also, the Ramsey RESET test for linearity supports the specification of a linear relationship between manufacturing sector performance and its determinants in this study as reported in Table 5.

5. Conclusion and Policy Implications

The study analysed the moderating effect of monetary policy and financial development on manufacturing sector performance in Nigeria. To address the problem of the dwindling contribution of manufacturing sector to national output overtime, the ARDL result of the study support our conclusion that the moderating impact of monetary policy and financial development on manufacturing sector is complementary for Nigeria. Theoretically, this conclusion extends the frontiers of theory by establishing a nexus between the Keynesian theory of money and the Romer growth theory through the significant joint impact of financial development and monetary policy on manufacturing. The study suggests that policymakers should simultaneously pursue expansive monetary policy and financial development strategies as a panacea to manufacturing sector underperformance in Nigeria. Finally, studies in the future could explore whether the complementary impact found in this study follows a unidirectional or bidirectional causality.

Declaration

The views, opinions, and recommendations presented in this work are solely those of the authors and do not necessarily represent those of their institutional affiliation.

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