THE IMPACT OF INTEREST RATE DYNAMICS ON THE PERFORMANCE OF THE MANUFACTURING SUB-SECTOR IN NIGERIA (1980 AND 2012)

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Abstract: *The major focus of the research is to empirically investigate the impact of interest rate dynamics on performance of manufacturing- sub sector in Nigeria. The research covers the period between 1980 and 2012. This period is important since it includes the pre-structural adjustment programme (SAP) era where interest rate was not liberalized and the structural adjustment programme period where interest rate is liberalized. The co-integration technique with its implied error correction mechanism was used for the study. The result shows that the high interest rate in Nigeria has hindered the performance of the manufacturing sub sector. The GARCH and ARCH results indicates that interest rate dynamics has influenced the performance of the manufacturing sub-sector. The result also confirms a long run relationship among the variables. It was therefore recommended amongst others, that there should be a drastic reduction in the interest rate coupled with the adoption of liberalized interest rate regime with some caution; this will increase the performance of the manufacturing sub- sector in Nigeria.*

Keywords: Impact, Interest Rate Dynamics, Performance, Manufacturing Sub-Sector, Nigeria

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INTRODUCTION

Although Nigeria had embarked on financial sector reforms in 1987, the economy continued to move on the brink of collapse with volatility in virtually all major macroeconomic aggregates. The economy is still characterized by infrastructural decay, widespread corruption, inefficiency in private and public sector as well as low level of private sector participation in economic activities. The net result is a near collapse in investment level leading to decline of real output and falling per capita income from 1980 to the present day. Experts have posited that structural reforms good as it may seems must transcend mere macroeconomic stabilization. It must logically involve increase in productive investment so that increased national income and eventually full employment can be achieved (Fitzherid *et a*l1992). This is supported by the Economic Commission for Africa ECA (1999) when it posited that economic growth as an expansion of macro capacity of an economy is a function of the distribution of current resources between consumption and investment needs to achieve sustainable growth and development. The

introduction of SAP led to the financial sector reform like; deregulation of interest rate, exchange rate and other deregulations according to (Ogwuma, 1993; Ojo, 1993). However as a reversal policy the government in January 1994 expressly introduced some measures of regulation into interest rate management owing to wide variations and unnecessarily high rate under the complete deregulation of interest rates. In light of the above, the deposit rates were once again set at 12.45% per annum while a ceiling of 21% per annum was fixed for lending rate. The ceiling on interest rates introduced in 1994 was retained in 1995 with a little modification for flexibility but was lifted in October 1996 to pursue a flexible interest rate regime as observed by Omole and Falokun (1999). In line with the adoption of the market-based technique of monetary management, interest rates policy remained flexible and responsive to changes in market conditions. However, as an instrument of monetary policy the central bank of Nigeria CBN (2000) indirectly influenced the level and direction of change in interest rate movement through its intervention rate on various money market instruments especially the Minimum Rediscount Rate (MRR) as well as the stop rate of weekly tender for treasury bills. The MRR as the nominal anchor of CBN's interest rate policy continued to be used proactively in line with prevailing economic conditions while the rate of treasury bills was made competitive with comparable money market instruments CBN (2006).

Further, the MRR has undergone some fluctuations since 1987 to date as a result of the changes in the CBN policies which in turn have changed the overall economic conditions. In August 1987, it was 15.0% and was reduced to 12.75% in December of 1987 with the objective of stimulating investment and growth in the economy. In 1989, the MRR was raised to 13.25% in order to contain inflation. To further liberalize interest rate management, the ceiling on interest rate was lifted in 1992 and re-imposed in 1994 when inflationary spiral could not be contained. However, in October 1996, interest rates were fully deregulated with the banks given freedom to determine the structure of interest rates in consultation with their customers. The CBN however, retained its discretionary power to intervene in the money market to ensure tolerable movement in interest rates. The policy of interest rate deregulation has been retained since 1997 while the MRR was replaced with the Monetary Policy Rate (MPR). Again, the MPR was brought down to 10% from 14% with a lending rate of 13% and a deposit rate of 7% which stood as a standing policy intended to stem volatility in interest rates especially that of the interbank rates. It is pertinent to know that under a deregulated interest rate system the market plays a vital role in determining the rate of interest. This implies that both banks and their customers are free to be on the round tables to negotiate and arrive at a suitable interest rate on deposits and loans receptively. Empirical evidence abounds that the financial sector reform with objective of low interest rate did not achieve the desired level of interest rate regime (Usman 2001). This observation among others has necessitated the researcher to investigate the impact of interest rate dynamics (changed) on the performance of the manufacturing sub sector of the Nigeria economy.

OBJECTIVES OF THE RESEARCH

The major objective of the research is to empirically investigate the impact of interest rate dynamics on the performance of manufacturing sub sector of the Nigerian economy. The specific objectives include:

1. To establish the impact of interest rate variation on the performance of the manufacturing sub-sector.
2. To examine the impact of inflation on the performance of the manufacturing sub-sector.
3. To evaluate the relationship between exchange rate and manufacturing sub-sector performance.
4. To ascertain the impact economic growth on manufacturing-sub sector performance.

RESEARCH HYPOTHESES

The following hypotheses will be tested. They are stated in the null form.

HO(1) There is no significant relationship between interest rate variation and the level of manufacturing output in Nigeria.

HO(2) There is no significant relationship between inflation rate and manufacturing output in Nigeria.

HO(3) There is no significant relationship between exchange rate and manufacturing output in Nigeria.

HO(4) There is no significant relationship between the level of economic growth and manufacturing output.

MATERIAL AND METHODS

The cointegration and vector error correction modeling was adopted for this study. But before proceeding to test for cointegration and estimation of parameters, the augmented Dickey – Fuller unit root test will be carried out to test the stationary of the time series data.

Econometric Model for Estimation:

The empirical model to be estimated is thus specified below:

$MQ = \propto + \propto_1 IR + \propto_2 INFL + \propto_3 ER + \propto_4 RGDP + Vt$

$\propto_1 < 0, \ \propto_2 < 0, \ + \propto_3 > 0, \ \propto_4 > 0$

Where MQ is manufacturing output, IR is interest rate, INFL is inflation rate, ER is the exchange rate, RGDP is the Real Gross Domestic product. $\propto_1$, $\propto_2$, + $\propto_3$, $\propto_4$ are parameters to be estimated and they measure the slope of the regression equation. When in natural logarithm form, they represent the various elasticities. Vt is the random variable which accounts for other factors not included in the model. The first step in analyzing the results is the unit root test. This is followed by the cointegration test and the error corrections. The variance decomposition is the last in the session.

UNIT ROOT TEST

The Augmented Dickey fuller (ADF) unit root test was used to assess the data. The result of the ADF unit root test is shown in table I below:

Summary of ADF Unit Root Test Result

Variable	Level Data	First difference	1% Critical Value	5% Critical Value	10% Critical Value	Order of Integration
MQ	-1.64	-6.22*	-3.67	-2.96	-2.62	1(1)
RGDP	1.96	-3.87*	-3.67	-2.96	-2.62	1(1)
ER	-0.06	-3.56**	-3.67	-2.96	-2.62	1(1)
INFL	-3.09	-5.38*	-3.67	-2.76	-2.62	1(0)
IR	-2.18	-5.15*	-3.67	-2.76	-2.62	1(1)

Source: Software computation.

NB:* Indicates statistical significance at the 1% le

** indicates statistical significance at the 5 percent level.

The result shows that all the variables except inflation were originally non-stationary. They however became stationary after the first difference was taken. That is they are 1(1). Inflation was stationary at the levels because it is in percentages. This thus leads us to the test for cointegration.

COINTEGRATION TEST

The Johansen cointegration test was used to test for the existence of a long run relationship among the variables. The result of the cointegration test is shown in table2

Appendix 6

Hypothesized No. of CE(s)		Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None	**	0.913180	152.0865	68.52	76.07
At most 1	**	0.742536	78.76888	47.21	54.46
At most 2	**	0.537871	38.06260	29.68	35.65
At most 3		0.326978	14.90524	15.41 3.76	20.04
At most 4		0.095945	3.025941		6.65

Hypothesized No. of CE(s)		Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None	**	0.913180	73.31759	33.46	38.77
At most 1	**	0.742536	40.70628	27.07	32.24
At most 2	*	0.537871	23.15736	20.97	25.52
At most 3		0.326978	11.87930	14.07	18.63 6.65
At most 4		0.095945	3.025941	3.76	

Table 2: Summary of Johansen cointegration test.
Source: Software computation.

The result of the Johansen cointegration in both the trace statistic and the Max-Eigen statistic indicates three cointegrating equation in each case. This is an indication of the existence of a long run relationship among the variables. The existence of a long run relationship enables us to test for what constitutes the true cointegrating equation. The vector Error correction (VEC) was used for this purpose.

VECTOR ERROR CORRECTION (VEC)

The VEC result is used in this case to identity the true cointegrating equation. The relevant section of the VEC result is shown below:

Cointegrating Eq:	CointEq1				
LMQ(-1)	1.000000				
LIR(-1)	0.690405 (0.23155) [2.98166]				
LER(-1)	0.319936 (0.07528) [4.24967]				
LRGDP(-1)	-2.748007 (0.25061) [-10.9651]				
INFL(-1)	-0.065381 (0.00434) [-15.0681]				
C	23.75996				
Error Correction:	D(LMQ)	D(LIR)	D(LER)	D(LRGDP)	D(INFL)
CointEq1	-0.831401 (0.33612) [-2.47350]	0.065435 (0.09125) [0.71707]	0.225631 (0.13903) [1.62290]	-0.039128 (0.01629) [-2.40220]	6.481444 (6.42921) [1.00812]

Table 3: Summary of VEC Result: Appendix 7
Source: Software Computation.

VEC result indicate that the manufacturing output and the Real Gross Domestic Product equation constitutes the true cointegrating equations.

Overparameterize Error Correction Mechanism (ECM) Model

The Overparameterize ECM result involves two lags each of the independent variables. The result of the overparameterize ECM result is shown below:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLIR	-2.348888	0.725388	-3.238112	0.0051
DLIR(-1)	0.298140	0.714619	0.417202	0.6821
DLIR(-2)	1.290363	0.608272	2.121359	0.0499
DLRGDP	-15.38886	4.509800	-3.412317	0.0036
DLRGDP(-1)	3.658601	3.402371	1.075309	0.2982
DLRGDP(-2)	-0.255177	0.458867	-0.556102	0.5858
INFL	-0.036882	0.012117	-3.043727	0.0077
INFL(-1)	0.046344	0.014851	3.120597	0.0066
INFL(-2)	-0.039531	0.011561	-3.419282	0.0035
DLER	-0.542089	0.479803	-1.129816	0.2752
DLER(-1)	0.667347	0.178440	3.739888	0.0000
DLER(-2)	-0.250345	0.498093	-0.502608	0.6221
ECM(-1)	-0.331315	0.145534	-2.276540	0.0310
C	1.361841	0.455694	2.988498	0.0087

Table 4: Summary of Overparameterize ECM Result Modelling:Appendix 8
Source: Software computation.
R_2 = 0.72, DW = 2.18, AIC = 2.14, SC = 2.79

The parsimonious (Preferred) ECM result was gotten by deleting insignificant variables from the overparameterize ECM result. The Aikaike information criterion are used in selecting the appropriate lag length.

Parsimonious ECM Result and Test of Hypotheses.

The parsimonious ECM result was used in testing the various hypotheses. The result of the parsimonious ECM result is shown below:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLIR	-0.694378	0.057300	-12.11823	0.0000
DLIR(-2)	-0.278391	0.107894	-2.580236	0.0139
DLRGDP	0.250679	0.063116	3.971709	0.0005
INFL	-0.036346	0.010045	-3.618386	0.0016
INFL(-1)	-0.042171	0.011776	-3.581004	0.0018
INFL(-2)	-0.032745	0.009448	-3.465871	0.0023
DLER(-1)	0.833970	0.389805	2.139453	0.0443
ECM(-1)	-0.383472	0.178956	-2.142827	0.0413
C	1.109727	0.311584	3.561564	0.0018

Table 5: Parsimonious ECM Result: Appendix 8
Source: Software computation.
R_2 = 0.67, AIC = 1.96, SC = 2.38, DW = 2.14,t critical 1.96 ,

The t test in the parsimonious ECM result will be used to test the various hypothesis. The decision rule is to validate the alternative hypothesis if the t calculated is greater than t critical and the reverse is true if the t calculated < t critical

TEST OF HYPOTHESIS I

The first hypothesis is restated below. There is no significant relationship between interest rate and the output of the manufacturing sector.
The t calculated in this regard with a value of -12.11 is > t critical of 1.96. this is an indication of the validation of the alternative hypothesis that there is a significant relationship between interest rate and manufacturing output. This provides an indication that variations in the interest rates has influenced the real sector performance in Nigeria.

TEST OF HYPOTHESIS TWO

The second hypothesis is restated below:
There is no significant relationship between the level of Economic growth and manufacturing output. The t calculated (3.97) > t critical (1.96). This is an indication of the validation of the alternative hypothesis. That there is a significant relationship between the level of economic growth and manufacturing output in Nigeria. The result insinuates that the level of economic growth matters for the performance of the manufacturing sector in Nigeria.

TEST OF HYPOTHESIS THREE

There is no significant relationship between the inflation rate and the output of the manufacturing sector. The t calculated (-3.58) > t critical (1.96) an indication of the validation of the alternative hypothesis that there is a significant relationship between inflation rate and the output of the manufacturing sector in Nigeria. An indication that he real sector is influenced by the general price level.

TEST OF HYPOHESIS FOUR

There is no significant relationship between the exchange rate and the level of manufacturing output in Nigeria. The t calculated (-3.47) > t critical (1.96). An indication of the validation of the alternative hypothesis that there is a significant relationship between exchange rate and the output of the manufacturing sector in Nigeria. An indication that the operators of the real sector in Nigeria are concerned about the exchange rate.

ARCH/GRACH

The Autoregressive conditional Heteroskedasticity (ARCH) and the generalized Autoregressive conditional Heteroskedasticity (GARCH) was used to test whether or not interest rate dynamics has influenced the performance of the manufacturing sector in Nigeria. The result is shown below:

ARCH/GARCH test Dependent variable: LMQ. Please see Table 6 BELOW:

	Coefficient	Std. Error	z-Statistic	Prob.
LIR	0.193709	0.412276	0.469852	0.6385
C	9.171800	1.236519	7.417438	0.0000
	Variance Equation			
C	0.040281	0.016353	2.463159	0.0138
ARCH(1)	0.108651	0.038276	2.838650	0.0045
GARCH(1)	0.960448	0.078782	12.19127	0.0000

Source: Software computation.

ANALYSIS OF RESULT

The summation of the ARCH (1) and the GARCH (1) is approximately unity. This provides an indication that the interest rate dynamics has influenced the performance of the manufacturing sector. Shocks to interest rate explained 3 percents of changes in

manufacturing output in the fifth period. This did not change till the last period. Shocks to manufacturing output explained 27 percent of changes in interest rate in the first period. This decreased to 4 percent in the last period. Shocks to manufacturing output explained 17 percent of changes in exchange rate in the first period. This reduced to 12 percent in the last period. Shocks to interest explained about 28 percent of change in exchange rate in the first period and reduced to 16 percent in the last period shocks to manufacturing output explained 5 percent in economic growth in the first period which reduced to 1 percent in the last period. Shocks to interest rate explained about 3 percent of the changes in economic growth in the first period, which did not change in the last period. Shock, to manufacturing output explained about 4 percent of changes in inflation rate in the first period, which increased to 37 percent in the last period. Shock to interest rate explain about 5 percent of shocks to interest rate in the first period which increased to 9 percent in the last period.

CONCLUSION

Interest rate dynamics has been a major policy focus in almost all countries in the globe. The developed and emerging economies like South Korea, China, etc carefully maintain an interest rate policy that improve the performance of the real sector. This is why, sometimes in the United States, the interest rate is reduced to as low as 1 percent in order to boost the performances of the real sector and create jobs. In Nigeria, however, the result indicates that the high interest rate has hindered the performance of the manufacturing sector. The result shows further that an increase in the interest rate by 1 percent reduced the output of the manufacturing sector by 69 percent. This high elasticity is an indication of the damage that high interest rate policy has caused to the manufacturing and by extension real sector of Nigerian economy. GARCH(1) and ARCH(1) results indicates that the dynamics in interest rate has influenced the output of the manufacturing sector in Nigeria. The cointegration result shows a long run relationships among the variables. The Error correction mechanism indicates a satisfactory speed of adjustment. It shows that about 38 percent of the errors is corrected each period.

RECOMMENDATIONS

We therefore recommend that the monetary authorities in Nigeria should reduce the interest rate on loans to the manufacturing-sub sector of the economy. This will increase the output of that sector. It is also recommended that concerted efforts should be made to tackle the high inflationary pressure in Nigeria which has hindered the performance of the real sector. Policy makers should learn from the examples of the developed and emerging economics that are even adopting the liberalized interest rate policy with caution and introducing some internal control measures to encourage real sector performance.

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