

Effect of Interest Rate on The Growth of Manufacturing Sector in Nigeria

OPUSUNJU Michael Isaac, PhD¹

AKYÜZ Murat, PhD²

SANTELI Jiya, Ndalo, PhD³

Abstract

The study examined the effect of interest rate on the growth of manufacturing sector in Nigeria. Data was collected from secondary sources covering a period of 32 years from 1985-2015 and this data were obtained through the CBN Statistical bulletin and National bureau of statistics. The population of the study includes all the manufacturing firms in Nigeria. Unit root test and simple regression analysis was used to analysis data. The finding is that there is a significant effect of interest rate on growth of manufacturing sector in Nigeria. The study recommends that Banks in Nigeria should try to charge low interest rate to enable the growth of manufacturing sector since it statistically significant.

Keywords: Interest Rate, Capacity utilization, manufacturing output and growth of manufacturing sector.

Introduction

Interest rates refer to borrower's cost on a loan and the lender's reward on investment which manufacturing sector applied to increase its manufacturing output and capacity utilization. The government through Central Bank of Nigeria has been regulating interest rate in order to channel funds to manufacturing sector so that output of the sector will increase and their capacity utilization will also be improved. The slow performance of manufacturing sector in Nigeria is mainly due high interest rate or continuous increase in interest rate which has resulted in the reduction in capacity utilization and output of the manufacturing sector of the economy (Tomola, Adebisi & Olawale, 2012).

¹ Department of Business Administration, Nasarawa State University, Keffi, opusunjumike@gmail.com

² Department of Business Administration, Nile University of Nigeria, murat.akyuz@nileuniversity.edu.ng

³ Department of Business Administration, Nile University of Nigeria, jiyasant@yahoo.com

Manufacturing in Nigeria, however is still at an infant stage due to high interest rate which discourage businessmen who actually want to venture into manufacturing sector in Nigeria and the resultant effect is the reduction in manufacturing output and capacity utilization in the sector. The industrial base is small and the industries are concentrated in light consumer goods. There is hardly any production of capital and intermediate goods. Another feature of the manufacturing sector is its over-dependence on imports for the supply of raw materials and spare parts. As a result of this, many factories reduced their scale of operations significantly while some closed down completely leading to increase interest rates.

Previous study such as Adesanya (2010) study the impact of interest rates on the performance of the manufacturing sector in Nigeria (1970-2008). Bawuah, Yakubu and Alhassan (2014) investigates the effects of interest rate on micro, small and medium enterprises' (MSMEs) access to funds and their financing decision in Wa municipality of Ghana. This study fills the research gap by studying the effect of interest rates on the growth of manufacturing sector in Nigeria from 1985 – 2015 using simple linear regression.

The objective of this study is to examine the effect of interest on the growth of manufacturing sector in Nigeria. The study also aimed at: to determine the effect of interest rate on manufacturing output in Nigeria and to evaluate the effect of interest on capacity utilization of the manufacturing sector in Nigeria.

The study restricted to the effect of interest rate on the growth of manufacturing sector in Nigeria. The period of study is 31 years from 1985 to 2015 and this period is chosen because it involved a period where interest rate was deregulated in 1986 following the Structural Adjustment Programme launched that year. However as from 1991 government started a programme of guided regulation. This period of interest rate experiment provided the urge to make more studies on impact of this effort on the economy most especially the manufacturing sector.

The study will contribute immensely in aiding the government, policy makers, economic planners, researchers and the academia generally. This will provide an insight and understanding to the government how to regulate interest rate in order to realized increase in manufacturing output and capacity utilization. It is also of immense help in providing an

Effect of Interest Rate on The Growth of Manufacturing Sector in Nigeria

insight and knowledge to the general public, policy makers, economic planners, and manufacturing sector regulatory authorities and will also help researchers and academia for further studies regarding interest rate and manufacturing performance.

The hypotheses are stated in a null form and they are:

H₀₁: There is no significant effect of interest rate on manufacturing output in Nigeria

H₀₂: There is no significant effect of interest rate on manufacturing capacity utilization in Nigeria

Concept of Interest Rate

Interest rate summarizes the way of whole business debt summary, including the receipt of debt, excellence of the debt, expectations of visions participation proportions and fixed floating mixture of the debt (Brigo & Mercurio, 2006; Einav, Jenkins, & Levin, 2008). According to Lloyd (2006) and McConnell (2009), interest rates are a price paid for borrowing funds expressed as a percentage per year. It can also be defined as the price a borrower needs to pay to the lender for transferring purchasing power to the future. Crowley (2007) defined interest rate as money borrower pays for the use of money they borrow from a lender/financial institutions or fee paid on borrowed assets. Brock and Rojas (2000) defined interest rate spread as margin between interest income and interest expense as a percentage of total earning assets.

Concept of Growth

According to Brealey, Myers and Marcus (2009) growth performance is a way of determining how well a firm uses its assets from its core operations and generates revenues within a given financial period. Yacuzzi (2005) growth measures used by most organizations over a long period of time have largely been financial in nature. However, with time there have been concerns on the inadequacy of financial measures to capture many other areas of concern to performance of an organization.

Manufacturing Growth

Libanio (2006) argues that the manufacturing sector has an important role in the growth and performance of the economy but the manufacturing output was not enough to generate sizeable growth in the economy. Obasi (2000), showed that the manufacturing sector is typically the most dynamic component of the industrial sector and the degree of manufacturing is a measure of the extent to which the other components of the industrial sector. Söderbom and Francis (2002) the most frequently cited number-one problem for the firms is physical infrastructure, followed by access to credit, insufficient demand, cost of imported raw materials and lack of skilled labour. Uzaoga (1981) also threw more light on the low performance of the manufacturing sector in Nigeria. He made us to believe that Nigeria being a colony of Britain had to specialize on the production of raw materials while Britain serves as the main supplier of manufactured goods. According to him, this unfortunate pattern of investment promoted the theory based on a static scheme of comparative advantage whereby diverting the Nigerian economy into activities that offered little opportunity for technical progress. The few industries established depended on foreign inputs. All these distortions according to him affected the performance of the industrial sector in terms of its contribution to the gross domestic product, employment generation, capacity utilization; export and value added which are indices for measuring the performance of the manufacturing sub-sector

Manufacturing sector refers to those industries which are involved in the manufacturing and processing of items and indulge or give free rein in either the creation of new commodities or in value addition (Adebayo, 2010). To Dickson (2010), manufacturing sector accounts for a significant share of the industrial sector in developed countries. The final products can either serve as finished goods for sale to customers or as intermediate goods used in the production process. Loto, (2012) refers to manufacturing sector as an avenue for increasing productivity in relation to import replacement and export expansion, creating foreign exchange earning capacity, raising employment and per capita income which causes unrepeatable consumption pattern. Mbelede (2012) opined that manufacturing sector is involved in the process of adding value to raw materials by turning them into products.

Capacity Utilization

According to Slack, Chambers and Johnston (2007) capacity utilization is defined as the ratio of actual output to design capacity, symbolically it is expressed as: $CU = Ac * 100 / Dc$ (1) Where CU = Capacity Utilization, Ac = Actual output, Dc = Design capacity Design capacity is the capacity the technical designers have in mind when the operation was commissioned. It is hardly achievable in real life due to both planned and unplanned stoppages. The planned stoppages include set up, preventive maintenance, no work scheduled, quality sampling checks, shift change times etc. The unplanned stoppages include equipment breakdown, quality failure investigation, material stock outs, labour shortages and waiting for materials. The planned stoppages are unavoidable, while the unplanned are avoidable. In computing the actual output, both planned and unplanned stoppages must be deducted from the design capacity. The influence of some macroeconomic factors as predictors of capacity utilization has been well documented by scholars (Eniola, 2009; Adenekan 2010).

Manufacturing Output

Manufacturing output is a pre-requisite for economic development (Mjer, 1975) defined manufacturing output as the process of developing an economy founded on the process of manufacturing of goods. (Ezekwe, 1996) defined Manufacturing output as an extensive development of the manufacturing and productive system of an area developing countries view on industry as the leading essential for high rate of present and future growth and development.

Interest Rate and Manufacturing Growth

Adesanya (2010) study the impact of interest rates on the performance of the manufacturing sector in Nigeria (1970-2008). The study used secondary sources of data as sources of information on the structural and behavioral trends of interest rate and some other macro-economic variables as it affect the manufacturing sector during the period. This study employs the ordinary least squares (OLS) multiple regression as the techniques of statistical analysis to determine the impact of interest rates on the performance of the manufacturing sector in Nigeria. However, prior to performing the OLS multiple regression analysis, I examine the stationarity of the variables by performing the unit root test. This technique was employed to show the relationship between the depended variable-average manufacturing

capacity utilization and the explanatory variables i.e., interest rate, commercial bank's loan and advance to the manufacturing sector and the inflation rate. The result shows a weak and negative relationship between the explanatory variables- interest rate, inflation rate and dependent - the average manufacturing capacity utilization. This shows that bank rate of interest and the inflation rate is statistically insignificant factor influencing the manufacturing capacity utilization during the period 1970-2008.

Bawuah, Yakubu and Alhassan (2014) investigates the effects of interest rate on micro, small and medium enterprises' (MSMEs) access to funds and their financing decision in Wa municipality of Ghana. A multiple research method and descriptive survey were employed to permit the study to make use of both quantitative and qualitative data collection techniques and data analysis procedures. This is because we wanted to portray an accurate profile of the enterprises, events and situations in order to obtain information which can be analysed and patterns extracted and comparisons made. In all, 200 enterprises were chosen for the research. Evidence from the analysis shows that majority of MSME businesses have resorted to the use of equity financing for their operations. This was attributed to several factors of which interest rate was the leading cause. It emerged that interest rate affects choice of financing decision of MSMEs in Wa municipality.

Waseem and Abdul (2014) analyze the impact of interest rates changes on the profitability of commercial banks being operated in Pakistan by examining the financial statements of four major banks during 2008 to 2012. To examine the impact of interest rate changes on the profitability of commercial banks in Pakistan, Pearson correlation method is used in this study. As a result it is found that there is strong and positive correlation between interest rate and commercial banks' profitability. It means if the value of interest rate is increases/decreases then as result value of banks' profitability will also increases/decreases.

Isaac (2014) determined the effect of interest rates on financial performance of commercial banks in Kenya. The study used descriptive research design using secondary data obtained from Central Bank of Kenya for the period of five years from 2009 to 2013. Data obtained was analyzed using SPSS version 21 and results obtained tested for significance using ANOVA. The study found that interest rates have significant positive effect on financial performance of commercial banks in Kenya at 95% confidence level. The relationship between interest rates and financial performance was also found to be linear with increase in

Effect of Interest Rate on The Growth of Manufacturing Sector in Nigeria

interest rates leading to higher profitability. The study also concluded that bank size and interest rate volatility had effect on profitability of commercial banks. The study also found that the model containing interest rates and size of commercial bank can explain 64% of the changes in commercial banks profitability.

Obidike, Ejeh and Ugwuegbe (2015) examined the impact of interest rate spread on the performance of Nigerian banking industry for the period of 1986-2012. The study used OLS method of estimation to analyze the data generated from CBN statistical Bulletin and World Bank online data base. Testing for the properties of time-series, ADF test indicates that all the variables are integrated of same order I(1). The Co-integration test reveals that there exists a long-run relationship among the variables under consideration. The result shows that interest rate spread, negatively and significantly impact on bank performance in the long-run. Exchange rate and GDP was found to be positively and significantly affecting bank performance in Nigeria at the long-run. The result of the ECM indicates that 23.37 percent of the disequilibrium in the model will be corrected annually. Moreover at the short-run interest rate spread also negatively but insignificantly affect bank performance in Nigeria.

Theories of Interest Rate

Keynes's Liquidity Preference Theory

The theory was advanced by Keynes (2006). According to the liquidity preference theory, the interest rates are determined by the demand for and supply of money balances. The theory assumes that people's demand for money is not for transactions purpose but as a precaution and for speculative purposes. The transaction demand and precautionary demand for money increase with income, while the speculative demand is inversely related to interest rates because of the forgone interest. The supply of money is determined by the monetary authority (the central bank), by the lending of commercial banks and by the public preference for holding cash (Were, Kamau, Sichei, Kiptui, 2013).

Macroeconomic Theory

The theory was proposed by Friedman, (1963). The theory views interest rates as always and everywhere a monetary phenomenon (Friedman, 1963). Further, macroeconomic theory assumes that growing the money supply in excess of real growth causes interest rates to rise. This is also the result from the Harberger (1963) model, which assumes that prices adjust to excess money supply in the money market. It is on the basis of this assumption that it is possible to invert the real money demand and control interest rates. Interest rates volatility in open economies results from different disequilibria in many markets specifically, the domestic money market, external/foreign markets and the labour market. Thus increase in interest rates emanates from three main sources that include excess money supply, foreign prices and cost push factors (Were et al., 2013). The theory is related to keyesian liquidity preference theory but recognizes additional sources of interest rates not only demand for money but also foreign prices and cost push factors.

Methodology

The study used ex-post facto research design and ordinary least square regression to analyzed data. The reason for using ex-post factor research design is that researchers make use of historical data from secondary sources. Data for this study was gathered from the Central Bank of Nigeria statistical Bulletin and this is because manufacturing output, capacity utilization and interest rate data are recorded in Central Bank of Nigeria statistical Bulletin. The population of 2800 manufacturing companies in Nigeria according to manufacturers association of Nigeria report (2016) are considered. The e-view statistical software was adopted and data obtained from secondary source were tabulated and tested for stationarity of data using unit root test by applying Augmented Dickey Fuller (ADF). It is therefore used to asses whether the data are stationary or not which helps to avoid spurious regressions. The decision rule is that stationarity is attended if the absolute ADF value is higher than any of the absolute Mackinnon critical values at 1%, 5% and 10% levels of significance. Also, data were analyzed using simple regression models. The simple regression models are stated below:

Effect of Interest Rate on The Growth of Manufacturing Sector in Nigeria

$MOUT = \alpha + \beta INR + \mu \dots\dots\dots 1$

$MCU = \alpha + \beta INR + \mu \dots\dots\dots 2$

Where

MUOT = manufacturing output,

MCU = manufacturing capacity utilization in Nigeria,

INR= Interest# Rate

β_1 = is the coefficient of determination

α = constant term

μ = is the stochastic variable or error term.

The null hypothesis is rejected if the p-value is less or equal to the critical value at 0.05.

Data Analysis and Discussion

From the table 1 in appendix, the data sets of the variables were stationary at first level difference implying that the variables were integrated at the same order. MOUT is stationary at first level difference at a constant without trend and intercept at 1%, 5% and 10% level of significance, MCU which capacity utilization is stationary at first level difference at none exogenous without a constant, trend and intercept at 1%, 5% and 10% level of significance and INR which means interest rate is also stationary at first level difference at none exogenous without a constant, trend and intercept at 1%, 5% and 10% level of significance.

However, data were converted at first level different at the three variables were stationary and formula used are.

Genr Moutd=Mout-D(Mout).....3

Genr INRd=INR-D(INR).....4

Genr MUCd=MUC-D(MUC).....5

Genr. = generate, Moutd =manufacturing output at first level difference, MOUT=manufacturing output, difference of manufacturing output.

Interest Rate and Manufacturing Output in Nigeria

In table 2 in appendix, the coefficient of interest Nigeria is negative (-1.39) and is insignificant in achieving manufacturing output in Nigeria. The p-value of 0.01 is less than the t-statistic value of -2.57 and the standard error value of 0.44 which is greater than the t-statistic value of -2.57. This implies that a unit increase in interest rate will lead to 1.39 decreased in manufacturing output in Nigeria.

The coefficient of determination (r^2) of 0.69 indicates that 69% of variation in manufacturing output can be explained by interest rate in Nigeria. The remaining %31 can be explained by other related factors not noted in the regression model. The f-statistic value of 6.622102 is significant at p-value of 0.00 and Durbin Watson is 1.50 which indicates that there is a present of auto correlation between the dependent and independent variable. Also, this implies that there is an evidence of existence of linear relationship between interest rate and manufacturing output in Nigeria. Therefore, we accept the alternative hypothesis that there is a significant relationship between interest rate and manufacturing output in Nigeria.

Interest Rate and Manufacturing capacity Utilization in Nigeria

In table 3 in appendix, the coefficient of interest Nigeria is negative (-0.72) and is significant in achieving manufacturing capacity utilization in Nigeria. The p-value of 0.04 is greater than the t-statistic value of -1.89 and the standard error value of 0.38 which is greater than the t-statistic value of -1.89. This implies that a unit increase in interest rate will lead to 0.72 decreased in manufacturing capacity utilization in Nigeria.

The coefficient of determination (r^2) of 0.61 indicates that 61% of variation in manufacturing capacity utilization can be explained by interest rate in Nigeria. The remaining %39 can be explained by other related factors not noted in the regression model. The f-statistic value of 3.607318 is significant at p-value of 0.00 and Durbin Watson is 1.24 which indicates that there is a present of auto correlation between the dependent and independent variable. Also, this implies that there is an evidence of existence of linear relationship between interest rate

Effect of Interest Rate on The Growth of Manufacturing Sector in Nigeria

and manufacturing capacity utilization in Nigeria. Therefore, we accept the alternative hypothesis that there is a significant effect of interest rate on manufacturing capacity utilization in Nigeria.

Discussion of Findings

From the above analysis, the effect of interest rate on the performance of manufacturing sector in Nigeria is significant. This shows that interest rate significantly contributes to the manufacturing sector in Nigeria in terms of manufacturing capacity utilization (MCU) in the manufacturing sector of Nigeria and manufacturing output manufacturing sector of Nigeria. The finding is in tandem with the findings of Bawuah, Yakubu and Alhassan (2014) who found statistical significant relationship between interest rate and performance of manufacturing sector. The study is also consistent with Macroeconomic Theory which states that interest rates as always and everywhere a monetary phenomenon that affect transactions and macroeconomic theory assumes that growing the money supply in excess of real growth causes interest rates to rise.

Conclusions and Recommendations

The paper examine the effect of interest rate on the performance of manufacturing sector in Nigeria taken into consideration the effect of interest rate on manufacturing output and manufacturing capacity utilization in Nigeria. Findings from the study reveal that interest rate has significant effect on the performance of the manufacturing sector in Nigeria taken into consideration manufacturing output and manufacturing capacity utilization in Nigeria. This study concludes that the effect of interest rate on the performance of manufacturing sector in Nigeria is statistically significant. This implies that interest affect the performance of manufacturing sector in Nigeria.

Recommendations

Based on the findings the following recommendations are made that Banks in Nigeria should try to charge low interest rate to enable the growth of manufacturing sector since it statistically significant. Government should regulate interest more and try to monitor how the rate is charge by different banks to enable the manufacturing sector to increase output and their capacity utilization since interest rate increase in Nigeria affect the performance of manufacturing sector.

Reference

- Waseem, A. K. & Abdul, S. (2014). Impact of Interest Rate Changes on the Profitability of four Major Commercial Banks in Pakistan. *International Journal of Accounting and Financial Reporting*, 4(1)
- Enimola, S. S. (2009). The Determinants of Capacity Utilization in Nigeria Manufacturing Industry. *Journal of Economic Thought*, 3(1), 57- 63
- Yacuzzi, E. (2005) A Primer on Governance And Performance In Small And Medium-Sized Enterprises. *Journal of Business Management*, Vol. 2.
- Brealey, R.A., Myers, S.C & Marcus, A J. (2009). *Fundamentals of Corporate Finance*. 6th ed McGraw –Hill
- Isaac, M. N. (2014). The effect of interest rates on financial performance of Commercial banks in Kenya. University of Nairobi Press
- Adesanya, B. M. (2010). The Impact of Interest Rate on the Performance of the Manufacturing Sector in Nigerian (1970-2008) (December 18, 2010). Available at SSRN: <https://ssrn.com/abstract=2628878>
- Crowley,S. (2004). *Interest rate spread*. Cambridge, Mass.: National Bureau of Economic Research.
- Slack, N., Chambers, S., & Johnston, R. (2008). *Operations Management*. (5th ed.). UK: Prentice Hall.
- Brock,P.,& Rojas,L. (2000). *The debt threat: the dangers of high real interest rates for the world economy*. Oxford, UK: B. Blackwell.

Effect of Interest Rate on The Growth of Manufacturing Sector in Nigeria

Bawuah, B., Yakubu, A. S. & Alhassan, M. (2014). The Effects of Interest Rate on Micro, Small and Medium Enterprises Financing Decision in Wa Municipality of Ghana. *International Journal of Business, Humanities and Technology*, 4(4)

Obidike, P. C. Ekeh G. C. Ugwuegbe. S. U. (2015). The Impact of Interest Rate Spread on the Performance of Nigerian Banking Industry. *Journal of Economics and Sustainable Development*, 6(12)

Adenekan, S. (2010). Low Capacity Utilisation, Bane of the Nigerian Manufacturing Sector. [Online] Available: <http://www.punchng.com/Articl.aspx?theartic=Art201001072339196>. (January 8, 2010)

Appendix A

Null Hypothesis: D(MCU) has a unit root
 Exogenous: None
 Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.325599	0.0001
Test critical values:		
1% level	-2.647120	
5% level	-1.952910	
10% level	-1.610011	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(MCU,2)
 Method: Least Squares
 Date: 11/22/16 Time: 03:31
 Sample (adjusted): 1987 2015
 Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
----------	-------------	------------	-------------	-------

D(MCU(-1))	-0.955875	0.220981	-4.325599	0.0002
R-squared	0.596913	Mean dependent var		-0.437931
Adjusted R-squared	0.496913	S.D. dependent var		5.708125
S.E. of regression	4.432856	Akaike info criterion		5.849839
Sum squared resid	550.2058	Schwarz criterion		5.896987
Log likelihood	-83.82267	Hannan-Quinn criter.		5.864605
Durbin-Watson stat	1.711227			

Source: Data output using e-view statistical package, 2016

Decision rule: 1% level of significance, 5% level of significance and 10% level of significance

Null Hypothesis: D(MOUT) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.552766	0.0001
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(MOUT,2)

Method: Least Squares

Date: 11/22/16 Time: 03:35

Sample (adjusted): 1987 2015

Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MOUT(-1))	-1.024686	0.184536	-5.552766	0.0000
C	2.591577	1.544367	1.678084	0.1049
R-squared	0.533140	Mean dependent var		0.708276
Adjusted R-squared	0.515849	S.D. dependent var		11.66071
S.E. of regression	8.113635	Akaike info criterion		7.091441
Sum squared resid	1777.439	Schwarz criterion		7.185737

Effect of Interest Rate on The Growth of Manufacturing Sector in Nigeria

Log likelihood	-100.8259	Hannan-Quinn criter.	7.120973
F-statistic	30.83321	Durbin-Watson stat	1.671191
Prob(F-statistic)	0.000007		

Source: Data output using e-view statistical package, 2016

Decision rule: 1% level of significance, 5% level of significance and 10% level of significance

Null Hypothesis: D(INR) has a unit root
 Exogenous: None
 Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.871645	0.0000
Test critical values:		
1% level	-2.647120	
5% level	-1.952910	
10% level	-1.610011	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(INR,2)
 Method: Least Squares
 Date: 11/22/16 Time: 03:39
 Sample (adjusted): 1987 2015
 Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INR(-1))	-1.256576	0.182864	-6.871645	0.0000
R-squared	0.627750	Mean dependent var		0.025862
Adjusted R-squared	0.627750	S.D. dependent var		6.290427
S.E. of regression	3.837936	Akaike info criterion		5.561621
Sum squared resid	412.4331	Schwarz criterion		5.608769
Log likelihood	-79.64350	Hannan-Quinn criter.		5.576387
Durbin-Watson stat	1.793329			

Source: Data output using e-view statistical package, 2016

Decision rule: 1% level of significance, 5% level of significance and 10% level of significance