**IMPACT OF INTEREST RATE ON MANUFACURING SECTOR OUTPUT IN NIGERIA**

**BY**

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**TITLE PAGE**

**IMPACT OF INTREST RATE ON MAUNFACURING SECTOR OUTPUT IN NIGERIA (1981-2015)**

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**BEING A PROJECT PRESENTED TO THE DEPARTMENT OF ECONOMICS, FACULTY OF MANAGEMENT AND SOCIAL SCIENCES GODFREY OKOYE UNIVERSITY, ENUGU. IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE, (B.Sc) IN ECONOMICS.**

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**JULY 2018**

**DECLARATION**

I, Umo Blessing Edidiong with the registration number U14/MSS/ECO/086 am a student of the Department of Economics, Faculty of Management and Social Science Godfrey Okoye University Enugu. I declare that the research work titled “Impact of Interest Rate on Manufacturing Sector Output in Nigeria (1981-2015)” submitted in partial fulfillment of the requirement for the award of Bachelor of science (B.Sc) In Economics is my original work and has not been submitted either in part or in full of any other degree or diploma either in this or any other tertiary institution.

**…………………………. ……………………………**

**Umo Blessing Edidiong Date**

**CERTIFICATION PAGE**

This is to certify that the research work, Impact of Interest Rate on The Manufacturing Sector Output in Nigeria (1981-2015) by Umo Blessing Edidiong, in the Department of Economics has been examined and approved at meeting the requirement for the award of Bachelor of Science (B.Sc.) Degree in Economics, Faculty of Management and social science, Godfrey Okoye University, Enugu.

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 **DEDICATION**

This research work is dedicated to the family of Umo.

**ACKNOWELEDGEMENT**

My gratitude first and foremost goes to God Almighty for his protection and grace throughout this work.

I wish to express my profound gratitude to my project supervisor, Mr. Michael O. Nwaji, who in spite of his work load and tight schedule spared his time to go through this manuscript one after the other, making correction and giving necessary advice towards the completion of this project.

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To my Parents Mr. and Mrs. A. B. Umo, no amount of thank can measure up to your unconditional love, care, support and also providing for my needs academically, personally and otherwise. To my only sibling Barnabas U. Umo and also to my lovely friends who turned Sisters Boma S. Dodo, Okeke S. Onyinye, Onuigbo A. Goodness, Nnamoke C. Blessing and Others, may God bless you all handsomely.

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**ABSTRACT**

The study investigates empirically the impact of interest rate on manufacturing sector output in Nigeria. The broad objective of this study is; to determine the impact of interest rate on manufacturing sector output in Nigeria. Annual data on manufacturing sector output, inflation rate, commercial banks total loan volume

and interest rate from the Central Bank of Nigeria statistical bulletin and IndexMundi covering the period 1981 – 2015 were utilized. A model was constructed to incorporate manufacturing sector output as dependent variable, and commercial banks total loan volume, inflation rate and interest rate as the independent variables and tested using the Ordinary least Square (OLS) Methods. The Stationarity (Unit roots) status of the series was examined using the appropriate statistics. Some of the assumptions of the OLS models were also tested to avoid spurious regression. The granger causality test was also conducted to determine the directions of causality. However, the result showed that commercial banks total loan volume and inflation rate had positive impacts on manufacturing sector output in Nigeria during the period covered while interest rate had negative impact on manufacturing sector output of Nigeria. The study recommends that The Central Bank of Nigeria and other monetary authorities should reduce the interest rate being charged on loans borrowed from the commercial banks through the reduction of bank rate and other deposit requirements of the commercial banks in order to make funds available to the manufacturing sector of the country which will increase its output.

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**CHAPTER ONE**

**INTRODUCTION**

**1.1 Background of the Study**

Every good or service has a price. So also is the service of lending money to others, a service which is critical to the survival and growth of businesses, households and individuals. The price of this service is called interest rate.

 Like every price, interest rate is determined by the law of demand and supply of the commodity, which in this case is money. In the economy, the level of interest rate is chiefly determined by the amount of money or funds available for lending and borrowing.
 On the supply side are businesses, households and individuals that save. On the demand side are the individuals, households businesses, including government that borrow either to augment income or invest in income generating projects.
Between these groups are the banks and other financial institutions that mobilizes savings in the form of deposits and investment products and lend the funds mobilized to those who want to borrow.
As in the determination of other prices, those who supply the funds, the savers desire and demand for high interest rates, while those who borrow desire low interest rate. Meanwhile the banks also want to ensure that the lending interest rate covers the cost incurred for their operations, and adequate profit for their shareholders.
If the interest rate is too low, especially lower than the rate at which prices of goods and services are increasing (inflation), it would discourage people from saving, and it can make them to take their money out of the country to where the interest rate is high. But if the interest rate is too high, a lot of households and businesses would find it unprofitable to borrow or pass the high interest rate to consumers of their products.

Also, where the nature of the funds available for lending are short term, that is below one year, businesses would not be able to borrow to fund projects that have long gestation period. In this situation, the manufacturing sector and the agricultural sector would be at disadvantaged while the services sector would be at advantage. And that is the case in Nigeria, where 80 per cent of bank deposits are for tenures below one year.

In every country, the role of ensuring that the interest rate is not too low to discourage savings or too high to discourage borrowing for activities that indirectly increase investments and employment is entrusted to the central bank.

The primary objective of central banks is price stability or stable prices of goods and services. This they do by regulating the money supply in the economy. If the money is too much it can cause a situation where too much money chases few goods, and hence cause prices to rise persistently leading to inflation.

But sometimes in an attempt to ensure this does not happen the central bank introduces measures that reduce volume of money in supply, and this indirectly reduces money available for lending and thus increased the price of money, which is interest rate.

 The manufacturing sector plays a significant role in the transformation of the economy. For example, it is an avenue for increasing productivity related to import replacement and export expansion, creating foreign exchange earning capacity; and raising employment and per capital income which causes unique consumption patterns (Imoughele and Ismaila, 2014). Furthermore, Ogwuma (1995) opines that it creates investment capital at a faster rate than any other sector of the economy while promoting wider and more effective linkages among different sectors. Loto (2012) revealed that the Structural Adjustment Programme (SAP) introduced in May 1986 was partly designed to revitalize the manufacturing sector by shifting emphasis to increased domestic sourcing of inputs through monetary and fiscal incentives. The deregulation of the foreign exchange market was also effected to make non-oil exports especially manufacturing sector more competitive even though, this also resulted in massive escalation in input costs (Loto, 2012).

Examining the growth of the manufacturing sector over the years in Nigerian, the share of the manufacturing sector in gross domestic product has not been impressive. Over the thirty five (35) years of this study, the percentage of the manufacturing sector in GDP averaged 18% in the 80s’ (i.e. between 1981 and 1989). In 1994, the manufacturing sector contributed above 20% into the Nigeria’s GDP but have been on the decline afterwards. In the recent times, specifically from 2002, the manufacturing sector contributes less than 10% to gross domestic product and was almost but averaging 9% between 2013 and 2015. The highest growth rate of the Nigerian manufacturing sector of 60.3% was recorded in 1994 and although negative in 1984. The whooping 60% growth rate recorded in 1994 dropped drastically to 16.7% in 1995 and growing by a paltry 3% in 2015. This implies that the Nigeria manufacturing sector has not improved in terms of its growth rate from 1995.

This dismal performance of the sector in Nigeria could be attributed to massive importation of finished goods and inadequate financial support for the manufacturing sector, which ultimately has contributed to the reduction in capacity utilization of the manufacturing sector in the country. The insignificant contribution of the sector to gross domestic product could be as a result of continued deterioration in infrastructural facility as well as lack of access to cheap finance. Obamuyi, Edun and Kayode (2010) asserted that the growth rate of manufacturing sector in Nigeria has been constrained due to inadequate funding, either due to the inefficient capital market or the culture of the Nigerian banks to finance mainly short term investment. The long term funds from the banking sector are not easily accessible as a result of the stringent and restrictive credit guidelines to the sector as well as high interest rates. All these could be the reason why the Nigerian manufacturing sector has failed to serve as an avenue for increasing productivity in relation to import replacement and export expansion, creating foreign exchange earning capacity, rising employment and per capita income, which causes unique consumption patterns.

The manufacturing sector in Nigeria is faced with the problem of accessibility to funds. Even the financial sector reform of the Structural Adjustment Programme (SAP) in 1986, which was meant to correct the structural imbalance in the economy and liberalize the financial systems did not achieve the expected results (Obamuyi, Edun and Kayode, 2010). As Edirisuriya (2008) reported, financial sector reforms are expected to promote a more efficient allocation of resources and ensure that financial intermediation occurs as efficiently as possible.

This also implies that financial sector liberalization brings competition in the financial markets, raises interest rate to encourage savings, thereby making funds available for investment, and hence lead to economic growth (Asamoah, 2008). However, these seem not to be the case in Nigeria.

Since the inception of the Central Bank of Nigeria (CBN) on 1st July, 1959, monetary policy has been under the control of the Bank (CBN). Before 1st August 1987, interest rate was under theregulation of the central Bank. This regulation was achieved by fixing the range within both deposits and the lending rates are to be maintained.

According to the CBN**,** interest rate of orderly growth of the financial regulation is for the promotion market, to combat inflation and to lessen the burden of internal debt servicing of the government.

Since the deregulation, interest rates have been rising almost uninterruptedly especially in recent years. From the average of 12.6 percent at the end of July, 1987, which marked the end of' the era of administrative determination of the rates, lending rates moved to 17.6 percent in August 1987 - the immediate month commencing the period of deregulation of the rates.

The rapid upward movement in the interest rates was not favourable to production, growth and infact the manufacturing sector of the economy. Although the deposit rate seemed high enough to promote rising flow of saving, the high lending rate appeared to have hindered the usage of the resources mobilized. In an attempt to economize on a resource that was getting increasingly expensive, many firms especially the manufacturers abstained from borrowing from banks while the bulk of those who borrowed made losses or profit margins that could not support production initiatives. This could have resulted in sharp curtailment of output. Long-term financial requirements for expansion was largely met through the floatation of new equity and debenture. This was confirmed by the large boost in the amount of new issue s of stocks and debentures during the period. While distribution trade and other quick yielding activities were able to obtain bank financing, investment in equipment and machinery for prosecuting expanding productive activities reduced sharply.

Although the high interest rate encouraged inflow of funds, the bulk of the inflow went to distributive trade and businessservices.

It is crystal clear that since the introduction of the policy on interest rates deregulation in the banking industry in August, 1987, the levels of the rates have persistently increased.

In particular, the lending rates of commercial and merchant banks assumed a sharp upward trend. This dealt a serious devastating blow to the manufacturing sector and the economy as a whole.

However, all the regulations and deregulations of interest rate in Nigeria were all in a bid to manage the country’s capital allocation through the financial sector. The essence of managing interest rates were based on the premise that the market, if freely allowed to determine the rate of interest would exclude some priority sectors. Thus, interest rates were adjusted through the “invisible hand” in order to promote increased level of investment in the various preferred sectors of the economy. Prominent among the preferred sectors were the agricultural, manufacturing and solid mineral sectors which were accorded priority and deposit money banks were directed to charge preferential interest rates on all loans to encourage the upsurge of small-scale industrialization which is a catalyst for economic development (Udoka and Roland, 2012). Thus, this study therefore examines the effect of interest rates on the performances of the Nigerian manufacturing sector.

**1.2 Statement of the Problem**

The observed reduction in manufacturing sector output in Nigeria is attributed to the instability of the interest rate in the country which discourages foreign and local investors to carry out investment activities which would be beneficial to the country. The dismal performance of the Nigerian manufacturing sector could be attributed to inadequacy of financial support for the manufacturing sector, which ultimately has contributed to the reduction in capacity utilization of the manufacturing sector in the country. The insignificant contribution of the sector to gross domestic product could be as a result of continued deterioration in infrastructural facility as well as lack of access to cheap finance characterized by rising lending rate. Also, the debt overhang has also discouraged investment in the manufacturing sector, through its implied credit constraints in international capital markets as a result of flawed interest rate policies by successive monetary authorities in Nigeria.

Have seen the series of problems that can emanate from flawed interest rate policy, the researcher therefore seeks to unravel further influence of interest rate on the manufacturing sector output in Nigeria.

**1.3 Objective of the Study**

The broad objective of this study is to determine the impact of interest rate on manufacturing sector output in Nigeria. The specific objectives of the study include:

1. To determine the impact of interest rate on manufacturing sector output in Nigeria.
2. To examine the impact of commercial bank total loan volume on manufacturing sector output in Nigeria.
3. To determine the impact of inflation rate on the manufacturing sector output in Nigeria.
4. To evaluate the direction of causality between interest rate, inflation rate, commercial bank total loan and manufacturing sector output in Nigeria.

**1.4 Hypotheses of the Study**

Based on the objective of the study, this study will evaluate the following hypothesis:

1. H0: Interest rate has no significant impact on manufacturing sector output in Nigeria.
2. H0: commercial bank total loan volume has no significant impact on manufacturing sector output in Nigeria.
3. H0: Inflation rate has no significant impact on manufacturing sector output in Nigeria.
4. H0: There exist no causal relationship between interest rate, inflation rate, commercial bank total loan volume and manufacturing sector output in Nigeria.

**1.5 Significance of the Study**

This research work will further serve as a guide and provide insight for future research on this topic and related field for researchers who are willing to improve it.

The study is also intended to assist policy makers in designing and implementing policies targeted at promoting interest rate and manufacturing sector output in Nigeria.

**1.6 Scope and Limitations of the Study**

The study investigates the impact interest rate on manufacturing sector output in Nigeria for a period of 34 years, from 1981-2015. This research work comprises of five parts. Part one constitutes the introduction, part two deals with the theoretical framework and the empirical reviewed. Part three focuses on the research methodology, while part four deals with the data interpretation and analysis. And finally, part five gives a summary, conclusion and policy recommendations.

In the course of the study, the researcher encountered series of difficulties ranging from collection of accurate data to technical and financial difficulties.

**CHAPTER TWO**

**LITERATURE REVIEW**

**2.1 Conceptual Literature**

**2.1.1 Concept of Interest rate**

In simple words, interest means the reward for the use of capital. It is also called the income of the owner of capital for lending it.
In other words, it is the price paid by the borrower of money to its lender.

 The concept of interest rate has also been explained by a lot of scholars in different ways; according to Marshall, Interest is the price paid for the use of capital in any market. J.M. Keynes sees Interest as a reward for parting with liquidity for a specified period. Cairncross, defines Interest as the price paid for the hire of loan capital. To Carver, Interest is the income which goes to the lender of capital by virtue of its productivity as a reward for its abstinence.

There are two concepts of interest as: Gross Interest and Net Interest. Gross Interest: Gross interest refers to the entire payments made by the borrower to the lender on a certain amount of loan received for a period of time. It includes not only the payment for the use of money capital but also for risks, inconvenience and management. Gross Interest = Net Interest + Risk bearing + Reward for management + reward for inconvenience. Net Interest:
Net interest is the payment purely made for the use of money. Net interest rate is determined by the forces of demand and supply of funds or money. It generally relates to public and is comparatively low to gross interest.

The loan market is not characterized by the prevalence of one definite rate of interest. Rate of interest differs from place to place and from person to person. A number of factors bring about such a situation.

1. Nature of Security: Interest rate varies with the type of property pledged behind the security. Loans borrowed against the security of gold carry less interest rate than loans against the security of immovable property like land or house.

2. Credit-Worthiness of the Borrower: Interest also depends upon the credit standing of the borrowers. It is because of this reason that persons of known integrity and credibility can get loans on easy terms.

3. Liquidity: Rate of interest also varies with the degree of liquidity of the asset offered as security against the loan. The greater the liquidity of the assets offered as security against the loan the lower will be the rate of interest and vice-versa.

4. Period of Loan: Rate of interest also depends upon the period of loan. Long-term rate of interest is higher than the short term. In a long term loan, money gets locked up for a longer duration. Naturally, the lender wants to be compensated by a higher rate of interest.
5. Amount of Loan: Rate of interest stands in an inverse relation to the amount of loan. The greater the amount of loan, the lower is the rate of interest and vice versa.

6. Difference Due to Distance: Distance between the lender and the borrower also causes difference between rates of interest. People are willing to invest their capital at a lower rate of interest in ventures nearer home than at a long distance.

7. Differences in Productivity: Productivity of capital differs from venture to venture. For highly productive ventures, people will be willing to borrow at a higher rate of interest and vice-versa.
8. Market Imperfections: Differences in the interest rate also originate from market imperfections that may be found in a loan market. In the words of Professor Bober, “In a given locality the few commercial banks may constitute an oligopoly with a degree of monopoly behavior, for short term commercial loans, their interest rates are then likely to stand above those which would rule under competition”. The discussion given above shows those different interest rates reflect differences in risk, length of loan amount and a host of other factors.

Interest rates can be expressed in either nominal or real terms depending on whether or not changes in the price level (inflation) are accounted for in their computations. If there is no adjustment for the changes in the price level, then the interest rate is expressed in nominal terms. A nominal interest rate is the interest rate that does not take inflation rate into account. It is practically the simplest type of interest rate, the type of rates quoted/stated by banks and other financial institutions for a given bond or loan. Another good example is the coupon rate for fixed income investments, and the interest rate paid on saving accounts. Nominal interest rate does not capture the whole story, because inflation during tenor of the loan/investment reduces the lender’s or investor’s purchasing power. They are not able to buy the same amount of goods or services as with the money realized at payoff or maturity of the loan or investment to the time they were secured.

Real interest rate, on the other hand, is the interest rate adjusted for changes in the price level. The adjustment is done by subtracting changes in the price level from the nominal interest rate in order to make it accurately reflect the true cost of borrowing. Changes in the price level can be “expected” or “actual”. When the adjustment is made using the expected change in the price level, the resulting real interest rate is called extant real interest rate. This is very important for economic decision. In instances where the adjustment is done using the actual change in the price level, the real interest rate becomes export real interest rate. In general, the lower the real interest rates; the greater the incentive to borrow and lower the incentive to lend and vice versa. Furthermore, real interest rate can be positive if the changes in the price are lower than the nominal interest rate. (CBN, 2016)

**2.1.2 Concept of Manufacturing**

The industrial output is the total output of all the facilities producing goods within a country. The manufacturing output, the output of all factories in a country, is a sub-set of industrial output.
Manufacturing production refers to the total production output from industries that consists of producing goods in factories or plants for a specific time period.

Manufacturing is the production of merchandise for use or sale using labour and machines, tools, chemical and biological processing, or formulation. The term may refer to a range of human activity, from handicraft to high tech, but is most commonly applied to industrial production, in which raw materials are transformed into finished goods on a large scale. Such finished goods may be sold to other manufacturers for the production of other, more complex products, such as aircraft, household appliances, furniture, sports equipment or automobiles, or sold to wholesalers, who in turn sell them to retailers, who then sell them to end users and consumers.

Manufacturing process are the steps through which raw materials are transformed into a final product. The manufacturing process begins with the product design, and materials specification from which the product is made. These materials are then modified through manufacturing processes to become the required part.

Modern manufacturing includes all intermediate processes required in the production and integration of a product's components. Some industries, such as semiconductor and steel manufacturers use the term fabrication instead.

**2.2 Theoretical Literature**

**2.2.1 Theories of Interest Rate**

The following points highlight the top seven theories of Interest.
The theories are: 1. Productivity Theory of Interest 2. Abstinence or Waiting Theory of Interest 3. The Austrian or Agio Theory of Interest or Bohm-Bawerk’s “The Time- Preference Theory” 4. Prof. Fisher’s Time Preference Theory 5. The Loan-Able Fund Theory of Interest.

**Productivity Theory of Interest**: This theory of Interest was expounded by J. B. Clark and F. H. Knight. Further Marshall, J. B. Say, Von-Thunen supported this theory. According to this theory interest arises on account of the productivity of capital.
The amount that labour produces with the help of capital goods is generally larger than the amount it can produce when working by itself. Machinery and tools invariably add to the income of those that use them. That is why they are demanded by individual employers. Further some classical economists hold that Interest is the reward paid to capital because it is productive. In fact, Interest is paid out of the productivity of capital. When more amount of capital is employed along with labour and other resources, the over-all productivity improves. By employing capital the borrower (entrepreneur) obtains higher production, he ought to pay a part of this additional production to the owner of capital in the form of Interest. The theory implies that capital is demanded because it is productive. And, because is productive its price, i.e., Interest must be paid.

**Abstinence or Waiting Theory of Interest**: This theory was expounded in 18th century by an eminent economist N. W. Senior. According to him, “Capital is the result of saving”. He was the first economist to point-out that saving, which was later on embodied in capital goods, involved a sacrifice, ‘abstinence’ as he called it.
People may spend the whole of their income in consuming present goods. But when they save they ‘abstain’ from present consumption. Such abstinence is disagreeable. Hence, in order to induce people to save, we must offer them some inducement as compensation for their sacrifice. Interest is therefore the compensation for abstinence. Marshall substituted the word ‘waiting’ for abstinence. Saving connotes waiting, when an individual saves a part of his income, he does not thereby eternally refrain from consumption. He only defers his consumption for a certain period, i.e., till the fruits of his savings come in an increasing flow afterwards. Meanwhile he must wait, and as a rule people do not like to wait. Not only saving, but all kinds of productive activity involve waiting. A farmer who sows his crops must wait till crops are harvested. The gardener who plants a seed must wait till it grows into a tree and begins yielding fruit.
Waiting is, therefore, a necessary condition for production. It is thus a separate factor of production and can be substituted for other factors. Since waiting is a factor of production, its price will be determined by the marginal analysis. That is, the rate of interest tends to equal the reward necessary to call forth marginal increment of saving.

**Bohm-Bawerk’s “The Time- Preference Theory**”: John Rae expounded this theory in the year 1834. Further, Bohm Bawerk developed this theory in an elaborate way. Bohm-Bawerk, an Austrian economist, is the main exponent of this theory which seeks to explain Interest on the basis of time-preference.
According to this theory, Interest is the price of time of reward for agio, i.e., time preference. It has been argued that man generally prefers present income to a future income and consumption. There is an ‘agio’ or premium on present consumption as compared to a future one. People prefer enjoyment of present goods to future goods because future satisfaction, when viewed from the present, undergoes a discount. Interest is this discount, which must be paid in order to induce people to lend money and thereby to postpone present satisfaction to a future date. Thus, Interest is the reward made for inducing people to change their time-preference from the present to the future. The positive time-preference of people may be attributed to the following reasons:
a. As compared to the future or remote wants, present wants are more intensely felt by the people.

b. Future wants are often under-estimated by people on account of various factors like lack of will power to resist temptation, deficiency of imagination, uncertainty about future as to whether they will be able to enjoy etc.

c. Present goods seem to have a technical superiority over future goods in a capitalist method of production because the present goods can be invested and re-invested immediately. Because of the higher productivity of capital, thus, more goods can be accrued in the immediate future while the future goods can be invested and re-invested in the remote future only.

**Prof. Fisher’s Time Preference Theory:** Fisher’s Time Preference Theory is the modified theory of Bohm-Bawerk. This theory is based on Bohm-Bawerk’s theory of Interest. While explaining this theory Prof. Fisher has said that—Time preference theory stresses the idea that the supply of loans depends on the fact that most people prefer to have a certain sum of money now than at some future time. People normally put a lower valuation on future goods than on present goods. Because of their time preference (i.e., preference for the present than the future) people are eager to spend their income on present consumption. Therefore, when somebody lends to someone, he has to forgo his present consumption. He can be made to leave his present consumption only when he is offered some sort of reward. This reward is Interest. Higher, the eagerness to spend on present consumption, higher will be the Interest rate. Thus, Interest rate depends on time-preference or an eagerness to spend income on present consumption.
In fact Fisher has defined Interest as “an index of the community’s preference for a dollar of present over a dollar of future income.” As he has said that the intensity of the people’s preference for present income depends on a host of subjective and objective factors.
These have been grouped under:

(i) Willingness, and

(ii) Opportunity.

Thus, Fisher based his theory of Interest on two principles, viz.:
1. the impatience or the willingness principles, and

2. the investment opportunity principle.

He laid down that Interest is determined by the preference of the people for the present income against future income, which in turn is determined by the willingness principle and the investment opportunity principle.

(a) Impatience or the willingness principles:

This depends on several factors, such as:

(i) Size of income,

(ii) Composition of income,

(iii) Distribution of income,

(iv) Uncertainty element in the future earnings,

(v) Personal attributes like foresight, precaution etc.

Some of these factors encourage people’s patience, some make them impatience. Say, for example, when income is enough, people will be satisfied more of current wants and discounting the future at a lower rate. If uncertainty of future is highly estimated, the rate of impatience will tend to be high.

When the rate of willingness is lower than the market rate of Interest a person will be willing to his income and wish to gain in future. But, if the market rate of Interest is lower than the rate of willingness, the person would like to borrow money and spend it on current consumption.

(b) The investment opportunity principle: This principle is another determinant of the rate of Interest. This principle refers to the rate of return over cost, viewed in a specific sense. To explain this phenomenon, let us assume that an individual is confronted with alternative investment proposals which imply two income streams that are substitutes. Hence, when he withdraws one income stream to substitute it for another, the loss experienced in the with-drawl is the ‘cost’, while the gain accruing from the adopted new income stream is the ‘return’. The rate of return over cost is, therefore, the rate of discount, which equalizes the present net values of the investment opportunities. The rankings of different investment proposals are decided in relation to the rate of Interest. If the discount rate is higher than the market rate of Interest, one of the two alternative proposals will be given up. The investment opportunity which carries a higher rate of return over cost will be accepted and the one which has a lower return will be rejected. In short, it can be said that the rate of willingness and the rate of marginal return over cost, together determine the people’s preference for present income rather than future income, which in turn, determines the Interest rate, because Interest is the price paid for this preference. Fisher’s Theory, in this way considers time-preference as the sole significant determinant of the supply of capital and the rate of Interest.

Classical Theory of Interest or Demand and Supply of Capital Theory of Interest: This theory was expounded by eminent economists like Prof. Pigou, Prof. Marshall, Walras, Knight etc. According to this theory, Interest is the reward for the productive use of the capital which is equal to the marginal productivity of physical capital. Therefore, those economists who hold classical view have said that “the rate of Interest is determined by the supply and demand of capital. The supply of capital is governed by the time preference and the demand for capital by the expected productivity of capital. Both time preference and productivity of capital depend upon waiting or saving. The theory is, therefore, also known as the supply and demand theory of waiting or saving.”
Demand for Capital: Demand for capital implies the demand for savings. Investors agree to pay interest on these savings because the capital projects which will be undertaken with the use of these funds, will be so productive that the returns on investment realised will be in excess of the cost of borrowing, i.e., Interest.
In short, capital is demanded because it is productive, i.e., it has the power to yield an income even after covering its cost, i.e., Interest. The marginal productivity curve of capital thus determines the demand curve for capital. This curve after a point is a downward sloping curve. While deciding about an investment, the entrepreneur, however, compares the marginal productivity of capital with the prevailing market rate of Interest.
Marginal Productivity of Capital = the marginal physical product of capital x the price of the product. When, the rate of Interest falls, the entrepreneur will be induced to invest more till marginal productivity of capital is equal to the rate of Interest. Thus, the investment demand expands when the Interest rate falls and it contracts when the Interest rate rises. As such, investment demand is regarded as the inverse function of the rate of Interest.
Supply of Capital: Supply of capital depends basically on the availability of savings in the economy. Savings emerge out of the people’s desire and capacity to save. To some classical economists like Senior, abstinence from consumption is essential for the act of saving while economists like Fisher. Stress that time preference is the basic consideration of the people who save. In both the views the rate of Interest plays an important role in the determination of savings. The chemical economists commonly hold that the rate of saving is the direct function of the rate of Interest. That is, savings expand with the rise in the rate of Interest and when the rate of Interest falls, savings contract. It must be noted that the saving-function or the supply of savings curve is an upward-sloping curve.
Equilibrium Rate of Interest: The equilibrium rate of Interest is determined at that point at which both demand for and supply of capital are equal. In other words, at the point at which investment equals savings, the equilibrium rate of Interest is determined.

**The Loan-Able Fund Theory of Interest**: The Neo-classical or the Loan-able Fund Theory was expounded by the famous Swedish economist Knot Wick-sell. Further, this theory was elaborated by Ohlin, Roberson, Pigou and other new-classical economists. This theory is an attempt to improve upon the classical theory of Interest. According to this theory, the rate of Interest is the price of credit which is determined by the demand and supply for loanable funds.
In the words of Prof. Lerner: “It is the price which equates the supply of ‘Credit’ or Saving Plus the Net increase in the amount of money in a period, to the demand for ‘credit’ or investment Plus net ‘hoarding’ in the period.”

Demand for Loan-able Funds: The demand for loanable funds has primarily three sources:

(i) Government,

(ii) Businessmen, and

(iii) Consumers who need them for purposes of investment, hoarding and consumption.

The Government borrows funds for constructing public works or for war preparations or for public consumption (to maintain law and order, administration, justice, education, health, entertainment etc.). To compensate deficit budget during depression or to invest in and for other development purposes. Generally government demand for loanable funds is not affected by the Interest rate. The businessmen borrow for the purchase of capital goods and for starting investment projects. The businessmen or firms require different types of capital goods in order to run or expand their production. If the businessmen do not possess sufficient money to purchase these capital goods, they take loans. Businessmen investment demand for loanable funds depends on the quantity of their production. Generally, the interest and firm’s investment demand for loanable funds has also inverse relationship. It means there will be less demand on higher Interest and more demand on lower Interest. The consumers take loans for consumption purposes. They prefer present consumption, they wish to purchase more consumption, goods than their present income allows and for that they take loans. They take loans to purchase mainly two types of consumption goods. First, durable consumption goods and secondly to purchase consumption goods of daily use and they generally open their accounts with the seller and go on purchasing goods on credit basis. Besides these they take loans for investment or speculative purposes also. Behind this they have profit motive.
Supply to Loanable Funds: The supply of loanable funds comes from savings, dis-hoardings and bank credit. Private savings, individual and corporate are the main source of savings. Though personal savings depend upon the income level, yet taking the level of income as given, they are regarded as Interest elastic. The higher the rate of Interest, the greater will be the inducement to save and vice-versa.
There is a positive relationship between Interest-rate and the supply of loanable funds. It means there will be more supply of loanable funds at higher interest and less supply on lower interest. Hence the supply curve of loanable funds will be an upward sloping curve from left to right.

**Keynes’s Liquidity Preference Theory of Interest or Interest is Purely a Monetary Phenomenon:** According to Keynes, Interest is purely a monetary phenomenon. It is the reward of not hoarding but the reward for parting with liquidity for the specified period. It is not the ‘Price’ which brings into equilibrium the demand for resources to invest with the readiness to abstain from consumption. It is the ‘Price’ which equilibrates the desire to hold wealth in the form of cash with the available quantity of cash. Here Liquidity Preference Theory is determined by the supply of and demand for money. Supply of money comes from banks and the government. On the other hand, demand for money is the preference for liquidity. According to Keynes people like to hoard money because it possesses liquidity. Hence, when somebody lends money he has to sacrifice this liquidity. A reward which is offered to make him prepared for parting with liquidity is called Interest. Therefore, in the eyes of Keynes—”Interest is the reward for parting with liquidity for a specific period.” Liquidity Preference or Demand for Money:
Liquidity preference means demand for cash or money. People prefer to keep their resources “Liquid”. It is because of this reason that among various forms of assets money is the most liquid form. Money can easily and quickly be changed in any form as and when we like. Suppose, you have a ten rupee note now you can change it into either wheat, rice, sugar, milk, book or in any other form you like. It is because of this feature of liquidity of money, people generally prefer to have cash money.

**2.2.2 Economic theory of production**

The economic theory of production provides the analytical framework for most empirical research on manufacturing. At the core of the theory is the production function, which postulates a well-defined relationship between a vector of maximum producible outputs and a vector of factors of production. Historical analyses of total factor productivity change conceptualize it as the change in output level controlling for input levels, i.e., the vertical shift of the production function.

Understanding the character of factor productivity has been a critical concern to economic scholars.

A number of studies have attempted to characterize productivity change as embracing technological advance, changing composition of the work force, investments in human capital, reallocation of resources from lower to higher productivity activities, and economies of scale (Nelson, 1981). To Nadiri (1970), Despite the haziness underlying the broad issue of manufacturing/productivity, the specific theme of trade policy and productivity growth has much more robust and clear-cut theoretical formulations underpinning it. One such theoretical construct is the x-efficiency argument. To recapitulate: development economists for a variety of reasons routinely argue that trade protection reduces industrial sector efficiency. In markets characterized by entry barriers, the absence of foreign competition allows domestic producers to enjoy monopoly power and excess profits. Consequently, these firms may fail to produce at minimum efficient scale (achieve “scale efficiency”) and/or to get the maximum possible output from their input bundles (achieve “technical efficiency” or “x-efficiency”).

This scenario is reversed when there is more liberalization and greater opening up to international competition. There is an implicit “challenge response” mechanism induced by competition, forcing domestic industries to adopt new technologies to reduce x-inefficiency and generally to reduce costs wherever possible. According to this argument, export expansion is good and so too is import liberalization.

Increasing returns formulation provides another line of argument common in the development literature. The contention here is that production costs will decline when markets are widened as a consequence of freer trade. Kaldor (1967) attributed this to the presence of scale economies, while Vedroom (1947) expressed it in terms of labour productivity (the phenomenon was subsequently called “Vedroom’s law” after him). The argument is usually cast in terms of the benefits of expansion in demand through increased exports.

A third theoretical postulate linking trade and productivity is based on the literature on foreign exchange constraints. In developing countries, intermediate and capital goods imports are not readily substitutable with domestically produced goods. In a sense, these imported inputs embody technologies that are unavailable to domestic producers and can only be obtained through imports. Consequently, policies that curb the availability of such imports, or make them more expensive, will lead to poor manufacturing performance. By contrast, policies that increase the availability of imported inputs or lower their cost (e.g., increased foreign aid or an export-led development strategy) will lead to cost reductions to domestic industries and hence to better productivity performance.

Technological catch-up models constitute another strand of the theoretical framework.

Another formulation by Rodrik (1988) contends that one way domestic producers compete is through choice of technique. Hence, producers could tacitly collude when protected from foreign competition by failing to modernize their plants; trade liberalization may induce defection from the collusive equilibrium. It is pertinent to note that the foregoing theoretical formulations are not mutually exclusive. The current state of knowledge does not make it possible to discriminate finely among them. Indeed, it may not be possible to state with any real confidence what is the direction of causation, as the possible relationships are myriad.

**2.2.3 Interest Rate in Nigeria**

Over the years, interest rates have remained a subject for critical assessment with diverse implications for savings mobilization and investment promotion. Generally, interest rates are the rental payments for the use of credit by borrowers and return for parting with liquidity by lenders (CBN, 1997). In the Nigerian economy, the minimum rediscount rate (MRR) now monetary policy rate (MPR) is the official interest rate of the Central Bank of Nigeria (CBN), which anchors all other interest rates in the money market and the economy (Ogunbiyi and Ihejirika, 2014). In August, 1987 the CBN liberalized the interest rate regime and adopted the policy of fixing

only its minimum rediscount rate to indicate the desired direction of interest rate. This was modified in 1989 when the CBN issued further directives on the required spreads between deposit and lending rates. In 1991, the government prescribed a maximum margin between each bank’s average cost of funds and its maximum lending rates. Later, the CBN prescribed savings deposit rate and a maximum lending rate. The removal of the maximum lending rate ceiling in 1993 saw interest rates rising to unprecedented levels in sympathy with rising inflation rate which rendered banks’ high lending rates negative in real terms (Ogunbiyi and Ihejirika, 2014). In 1994, direct interest rate controls were restored. As these and other controls introduced in 1994 and 1995 had negative economic effects, total deregulation of interest rates was again adopted in October, 1996.

Over the years, the maximum lending rate has been fluctuating and was above 30% in years 1992, 1993 and 2002. In the recent times, the maximum lending rate increased steadily from 22% in 2011 to 23%, 24%, 25% and 26% in years 2012, 2013, 2014 and 2015 respectively. This implies that the maximum lending rate in Nigeria increased by 1% during these periods.

The Central Bank of Nigeria (CBN) had to tighten money supply in a bid to curtail inflation. In the process, it has raised its interest rate (monetary policy rate) severally. For example, the MPR was raised six times last year from 6.5 in January to 12 per cent in December 2016. Also the banking crisis occasioned sharp decline in banks lending to the economy especially businesses in the real and agricultural sector.

On the other side, the CBN has also played developmental roles to ameliorate the impact of its tight monetary policy and stimulate bank’s lending to the critical sectors, by creating special funds which can be accessed at relatively low interest rate.  This it has done in line with its development mandate. Some of these include:
N500bn Real Sector Intervention Fund. The CBN established the N500 billion Real Sector Intervention Fund, comprising N300 billion Power and Airline Intervention Fund (PAIF) and N200 billion Refinancing and Restructuring Facility (RRF) for Small and Medium Enterprises (SME).

The PAIF was for lending to fund investment in the power sector to enhance on-going power sector reforms and to the aviation sector to revive ailing airlines. The RRF was to help refinance or restructure bank loans to SME and manufacturers that have gone bad.
The interest rate for lending under the scheme is 7.5 per cent. Under the PAIF, the CBN had released N120 billion for on-lending to 23 projects out of which N106 billion has been disbursed to 13 projects. N82 billion was disbursed to ten airlines while N23 billion was to three power projects.

Under the RRF, N191 billion has been disbursed to 539 beneficiary companies. This has enabled SME/manufacturing companies that have closed down to reopen and thus restore jobs that had been lost.
Commercial Agricultural Credit Scheme (CACS). Also, the CBN, in collaboration with the Ministry of Agriculture and Water Resources, established the N200 billion Commercial Agricultural Credit Scheme  (CACS) to enhance lending to agricultural sector to finance value chains from input to marketing. Among other things the scheme was designed to reduce cost of borrowing (interest rate) in agricultural production so that farmers can exploit more untapped potentials of the nation’s agricultural sector. It is also aimed at boosting output, generate employment and diversify the nation’s export base. Since inception in 2009, the CBN has released the sum of N151.015 billion for disbursement to 190 beneficiaries made up of 163 private promoters and 27 State Governments that accessed N1.0 billion each (apart from FCT which accessed N16.0 million only).

The analysis of number of projects financed under CACS by value chain showed that out of the 163 CACS private sector sponsored projects, production accounted for 44% and dominated the activities funded while processing accounted for 41.1%.

These activities were distantly followed by marketing and storage which registered 8% and 6.75% respectively. With regards to the value of funds released, processing accounted for 55.6% followed by production which accounted for 29.1% of the value of enterprises financed. These were followed by marketing and storage which registered 10.4% and 4.9% respectively.   In terms of job creation, the scheme has facilitated the creation of 20,826 new jobs; 185 skilled, 231 semi-skilled and 20,412 unskilled jobs. A key component of these initiatives is the single digit interest rate of 7.0 to 7.5 per cent interest rate for loans granted under each of them. Compared to the average interest rate of about 22 per cent charged by banks, this translates to 15 per cent interest rate discount for businesses in these critical sectors. Without this discount, many of the businesses would have collapsed or reduced operations and production. In the process they would lay-off staff, thus increasing unemployment and reduction in national productivity.

The implication of the above is that while interest rate likes every other price is determined by market forces of supply and demand, similarly, its determination rate and hence access to loanable funds if completely abandoned to market forces would ultimately hurt critical sector of the Nigerian economy.

**2.2.4 Manufacturing Sector in Nigeria**

Examining the growth of the manufacturing sector over the years in Nigeria, the share of the manufacturing sector in gross domestic product has not been impressive. Over the thirty five (34) years of this study, the percentage of the manufacturing sector in GDP averaged 18% in the 80s’ (i.e. between 1981 and 1989). In 1994, the manufacturing sector contributed above 20% into the Nigeria’s GDP but have been on the decline afterwards. In the recent times, specifically from 2002, the manufacturing sector contributes less than 10% to gross domestic product and was almost but averaging 9% between 2013 and 2015. The highest growth rate of the Nigerian manufacturing sector of 60.3% was recorded in 1994 and although negative in 1984. The whooping 60% growth rate recorded in 1994 dropped drastically to 16.7% in 1995 and growing by a paltry 3% in 2015. This implies that the Nigeria manufacturing sector has not improved in terms of its growth rate from 1995.

On capacity utilization, the manufacturing sector average capacity utilisation as at 1986 stood at 38.8% and increased to 40.3% in 1990. It further decreased to 29.29% and 36.1% in 1995 and 2000 respectively. The value of the average capacity utilisation in 2005, 2010 and 2012 was 54.8%, 56.44% and 55.82% respectively (Imoughele and Ismaila, 2014).

This dismal performance of the sector in Nigeria could be attributed to massive importation of finished goods and inadequate financial support for the manufacturing sector, which ultimately has contributed to the reduction in capacity utilization of the manufacturing sector in the country. The insignificant contribution of the sector to gross domestic product could be as a results of continued deterioration in infrastructural facility as well as lack of access to cheap finance. Obamuyi, Edun and Kayode (2010) asserted that the growth rate of manufacturing sector in Nigeria has been constrained due to inadequate funding, either due to the inefficient capital market or the culture of the Nigerian banks to finance mainly short term investment. The long term funds from the banking sector are not easily accessible as a result of the stringent and restrictive credit guidelines to the sector as well as high interest rates. All these could be the reason why the Nigerian manufacturing sector has failed to serve as an avenue for increasing productivity in relation to import replacement and export expansion, creating foreign exchange earning capacity, rising employment and per capita income, which causes unique consumption patterns.

The manufacturing sector in Nigeria is faced with the problem of accessibility to funds. Even the financial sector reform of the Structural Adjustment Programme (SAP) in 1986, which was meant to correct the structural imbalance in the economy and liberalize the financial systems did not achieve the expected results (Obamuyi, Edun and Kayode, 2010).

**2.2.5 The Structure of Manufacturing Sector in Nigeria**

According to the Bureau of Public Enterprise (BPE) (2006), players in the Nigerian industrial and manufacturing sector can be classified into four groups, Multinational, National, Regional and Local. However, the Manufacturers Association of Nigeria has categorized its industries into Large, Medium and Small Scales in line with the National Council of Industries (NCI) classification.

The Manufacturers Association of Nigeria (MAN) (2009), Standard Organization of Nigeria (SON), (2011), and the Raw Materials Research and Development Council (RMRDC), (2013), classified manufacturing sectors on the basis of the following products sectoral groups in Nigeria: Food, Beverages & Tobacco; Chemical and Pharmaceuticals; Domestic and Industrial Plastic and Rubber; Basic Metal, Iron and Steel and Fabricated Metal Products; Pulp, Paper & Paper Products, Printing and Publishing; Electrical and Electronics; Textile, Wearing Apparel, Carpet, Leather and Footwear; Wood and Wood Products Including Furniture; Non-Metallic Mineral Products; Motor Vehicle and Miscellaneous Assembly.

**2.2.6 Interest Rate and Manufacturing**

The interest rate is both a cause and effect of the level of production, which makes it very difficult to manage at a macroeconomic level. This is because access to money is both what drives an economy and an effect of its ups and downs.

Private Banks: High Interest Rates; When a private bank offers high interest rates, it discourages people from getting loans to pay for new houses, add capital to their businesses and buy equipment. High interest rates can stifle the general level of production in the economy. Private Banks may inadvertently stifle the level of production, but they do so in response to the amount of demand for debt. They do not try to stifle production, as this would cause their profits to become lower.

Private Banks: Low Interest Rates; when private banks offer low interest rates, the access to capital for new enterprises is increased. Businesses can be started or expanded, rents are lower, and there is generally more money flowing in the economy, which means the level of production is increased. However, private banks only do this when the level of production is already increasing--they respond to a demand for debt rather than trying to create it.

Reserve Bank: High Interest Rates; the Federal Reserve, which loans money to private banks has different goals. It sets interest rates at high levels when there is so much new money in the economy that the price of goods is rising, so as to reduce the value of money (demand-pull inflation). This means that the Fed increases interest rates when the level of production is high in order to make it lower.

Reserve Bank: Low Interest Rates. The Fed loans money to private banks at lower levels when it is trying to increase the levels of production. This is when inflation is rising because of a rise in the price of goods, due to taxes, changes in the dollar's value on international markets, or numerous other factors. The Fed does this in order to stimulate production to higher levels, but does it when production is at lower levels.

Catastrophic Effects: Interest rates can also have catastrophic effects on production levels if they are set at levels that are too low for the levels of production. This means that demand for debt is increased, but the supply of money to pay it is not commensurate with this demand. This can cause massive bank failure, as was evident in late 2008. When banking systems collapse to this magnitude, people lose their jobs, mortgages, and means of income, and wide-scale levels of production are dramatically reduced.

Macroeconomists have established the theoretical relationship between real output and monetary policy measures thus reiterating that the finance led growth advocated that market force induced higher interest rate would enhance more investment by channelling saving to productive investment and stimulate real output growth such as the manufacturing sector. Thus the crucial role of capital in the economic growth and development process had been recognized such that Industrialization is associated with heavy investments financed through capital accumulation. Meanwhile, for growth to occur there is the need for a relatively stable macro-economic environment characterized with low risk and a condition for attracting investment and boosting entrepreneurial activities. There is therefore the need to keep lending interest rate and inflation at a manageable limit in order to propel investments in the manufacturing sector and by implication, economic growth. This can only be achieved through the management of interest rate. Thus, interest rates were adjusted through the “invisible hand” in order to promote increased level of investment in the various preferred sectors (manufacturing) of the economy.

**2.3 Empirical Literature**

Imoughele and Ismaila (2014) examine the impact of monetary policy on Nigeria’s manufacturing sector performance for the period 1986-2012. Data were collected from the Statistical Bulletin and Annual Report and Statement of Accounts of the Central Bank of Nigeria as well as the Annual Abstracts of statistics (various issues) of the National Bureau of Statistics (NBS). Results of the study after ensuring data stationarity and cointegration show that the individual variables: external reserve, exchange rate and inflation rate were statistically significant to manufacturing sector output while broad money supply and interest rate were not statistically significant to manufacturing sector output in the previous and current year. However, interest rate, exchange rate and external reserve impacted negatively on the sector output but broad money supply and inflation rate affect the sector positively. The pair-wise Granger Causality results suggest that real exchange rate and external reserves granger cause Nigeria’s manufacturing output to each other unidirectional.

Obamuyi, Edun and Kayode (2010) investigate the effect of bank lending and economic growth on the manufacturing output in Nigeria. Times series data covering a period of 36 years (1973-2009) were employed and tested with the cointegration and vector error correction model (VECM) techniques. The findings of the study show that manufacturing capacity utilization and bank lending rates significantly affect manufacturing output in Nigeria. However, the relationship between manufacturing output and economic growth could not be established in the country. These results, therefore, call for concerted effort by the government, manufacturers and the lending institutions to reviewing the lending and growth policies and provide appropriate macroeconomic environment, in order to encourage investment-friendly lending and borrowing by the financial institutions. To this end, two hypotheses were formulated to investigate the relationship between interest rate and economic growth and the difference in economic growth before and after interest rate deregulation regime in Nigeria. Data were analyzed and tested using the ordinary least square multiple regression analytical technique and the result of the findings revealed that: there existed an inverse relationship between interest rate and economic growth in Nigeria. This implies that increase in interest rate will decrease GDP of the country, thus retarding growth of the real sector.

Ayanwale (2013) examined the impact of interest rates on the development of an emerging market using a time series analysis of 40 years (1970- 2010).The Error Correction Modelling (ECM) was adopted to reconcile fluctuations or changes both in the short and long run between the variables and the result shows that due to the ability to estimates the parameters of Error Correction Mechanism (ECM), which is generally consistent, sufficient, significant and negative. The non-zero coefficient of changes in interest rate and exchange rate in both ways been statistically significant indicates a short-run causality from interest rate to gross fixed capital formation as well as from changes in inflation to gross domestic product. Thus the paper recommends that pragmatic approach needs to be adopted to ensure that the lending rates are reduced to single digit in order to reduce production cost, high unemployment rate and encourage Foreign Direct Investment (FDI).

Adeyemi and Olufemi (2016) investigated the determinants of capacity utilization in the Nigerian manufacturing sector between 1975 and 2008. The study used capacity utilization as the dependent variable while its determinants such as Real Manufacturing Output Growth Rate (MGDP), Real Interest Rate (INTR), Consumer’s Price Index (CPI), Fixed Capital Formation in Manufacturing Sector (CPF) and Electricity Generation on Rate (ELEGR) (Proxy for energy) were used as independent variables. Cointegration and Error Correction Model (ECM) were employed as the estimation techniques so as to study the time series properties of the variables and to ascertain the existence of long-run relationship between capacity utilization and its determinant indicators. Structured questionnaire was administered to assess the operational materials and the performance of the selected firms. The findings of the study revealed that there is positive relationship between consumer’s price index, fixed capital formation in manufacturing sector and capacity utilization. The study also showed that there is negative relationship between electricity generation, real manufacturing output growth rate and capacity utilization which resulted in low manufacturing productivity growth rate in Nigeria.

Odior (2013) investigates the impact of macroeconomic factors on manufacturing productivity in Nigeria over the period 1975-2011. The analysis starts with examining stochastic characteristics of each time series by testing their stationarity using Augmented Dickey Fuller (ADF) test and estimate error correction mechanism model. The findings were reinforced by the presence of a long-term equilibrium relationship, as evidenced by the cointegrating equation of the VECM. He found that credit to the manufacturing sector in the form of loans and advances and foreign direct investment have the capacity to sharply increase the level of manufacturing productivity in Nigeria, while broad money supply has less impact. The study, therefore, recommends that government must create ‘’enabling environment’’ for manufacturers in the area of infrastructure, financial, legal and property rights. High cost of borrowing is due to high interest rate spread. Therefore, he advocated a cut in margin between lending and deposit rates.

Okonkwo, Egbulonu, and Mmaduabuchi (2015) examined the impact of monetary policy variables on manufacturing in Nigeria from 1981 – 2012. The theoretical relationship between monetary policy variables and manufacturing sector (that is, the real sector) was critically examined and established in this study using the Johansen cointegration test in order to establish long run equilibrium relationship between the explained and the explanatory variables. The error correction model (ECM) was employed to estimate the model and the study revealed that money supply and credit to private sector exert tremendous influence on manufacturing in Nigeria.

Ojo and Ololade (2014) assessed the contribution of manufacturing sector to economic growth in Nigeria in the era of globalization. Ordinary Least Square (OLS) econometric technique was used on time series data of relevant variables of manufacturing output, trade openness and current account balance and the study found that though Nigeria manufacturing sector benefited from globalization process, the level of the development in the sector was found to be highly negligible. Thus implying that globalization exerts little impact on economic growth via manufacturing sector of the economy.

**2.4 Limitations of the Previous Study**

 In the empirical reviews above, no study has been conducted on the direct impact of interest rate on manufacturing sector output in Nigeria.

Also, the various studies cited above have failed to state the statistical package used in carrying out their analysis.

This study seeks to handle this limitations and further insight the public on the influence of interest rate on the manufacturing sector output in Nigeria.

**CHAPTER THREE**

**RESEARCH DESIGN AND METHODOLOGY**

**3.1 Theoretical Framework**

The loan-able fund theory is the best suited theory for this research work and hence serve as the framework on which the methodology will be centered. The Loan-able Fund Theory was expounded by the famous Swedish economist Knot Wick-sell. According to this theory, the rate of Interest is the price of credit which is determined by the demand and supply for loan-able funds.

**METHODOLOGY**

In order to evaluate empirically the nexus that exist between the variables under study, a multiple linear regression model will be specified and the parameters will be estimated using the conventional ordinary least square (OLS) techniques. The ordinary least square techniques is used extensively in regression analysis because of its BLUE (best linear unbiased estimator) and also because it is mathematically simpler than other estimation techniques.

**3.2 Model Specification**

In order to capture the impact of interest rate on manufacturing sector output in Nigeria, the study will specify a multiple linear regression models.

The functional form of the model is specified as follows;

MOP=F (INFL, CBTL, INTR)

The econometrics form of the model is specified as;

MOP=β0 - β1INFL + β2CBTL - β3INTR + µ

β0 > 0, β1 <0, β2>0, β3<0

Where:

MOP = Manufacturing sector output

INFL = Inflation rate

CBTL = Commercial banks total loan volume

INTR = Interest rate

Where:

β0 = intercept

β1 = coefficient of Inflation rate

β2 = coefficient of Commercial banks total loan volume

β3 = coefficient of Interest rate

µ = stochastic error term

**3.3 Model Evaluation**

The estimated result will be evaluated in subject to four criteria; preliminary, economic, statistics and econometric criteria.

1. Preliminary Test
2. Economic Test of Significance (A Priori Test)
3. Statistical Test of Significance ( First Order Test)
4. Econometric Test of Significance ( Second Order Test)

**3.3.1 Preliminary Tests**

**3.3.1.1 Stationarity (Unit Root) Test**: The importance of this test cannot be over emphasized since the data to be used in the estimation are time-series data. In order not to run a spurious regression, it is worthwhile to carry out a stationary test to make sure that all the variables are mean reverting, that is, they have constant mean, constant variance and constant covariance. In other words, that they are stationary. The Augmented Dickey-Fuller (ADF) test would be used for this analysis since it adjusts for serial correlation. The model is specified as follows:

ΔMOPt-1 = β0 + β1INFLt-1 + β2CBTLt-2 + β3INTRt-3 +µt

**Decision Rule:** If the ADF test statistic is greater than the MacKinnon critical value at 5% (all in absolute term), the variable is said to be stationary. Otherwise it is non stationary.

**3.3.1.2 Co-integration Test:** Econometrically speaking, two variables will be co-integrated if they have a long-term, or equilibrium relationship between them. Co-integration can be thought of as a pre-test to avoid spurious regressions situations (Granger, 1986). As recommended by Gujarati (2004), the ADF test statistic will be employed on the residual. The model is specified as follows:

 µt = β2 + β1 MOPt + β2INFL + β3CBTL + β4INTR

**Decision Rule:** If the ADF test statistic is greater than the critical value at 5%, then the variables are co-integrated (values are checked in absolute term).

**3.3.1.3 Error Correction Mechanism:** If there exist a long run relationship (co-integration) among the time series variables, the Error correction mechanism will be estimated to know the rate at which the dependent variable returns to equilibrium to the independent variable after some levels of variations i.e to derive the numerical value of the magnitude of the short run dynamics or disequilibrium. Error correction models are theoretically driven approach useful for estimating both short-term and long-term effects of one time series on another. The term error-correction relates to the fact that last-periods deviation from long-run equilibrium, the error, influences its short-run dynamics. The model is specified as follows:

∆MOP∊t = 0 + 1 ∆INFLt +2 ∆CBTLt +3 ∆INTRt a 2ut-1 +∊t

**Decision Rule:** In conducting ECM, the expected sign of the result should be negative. A positive ECM implies a model misspecification or an indication of structural changes and will not give us the rate of these change in the dependent and independent variables.

**3.3.2 Economic Test of Significance (A Priori Test)**

These are determined by the principles of economic theory and refer to the sign and size of the parameters of economic relationship.

The expected signs for the parameters associated with the various variables are shown below

**Table 3.1 A priori Expectation**

|  |  |
| --- | --- |
| **Variables** | **Expected Signs** |
| MOP | +VE |
| INFL | -VE |
| CBTL | +VE |
| INTR | -VE |

**3.3.3 Statistical Test of Significance (First Order Test)**

These are determined by the statistical theory and aimed at evaluating the statistical reliability of the estimates of the parameters of the model, the most widely used statistical criteria is the square of correlation coefficient (coefficient of determination R2), T-Test and F-Test of significance.

**3.3.3.1 Test for Goodness of Fit**

The coefficient of multiple determinations (R2) is used to determine the proportion of variation dependent variable that is attributable to variation in explanatory variable. The value of R2 ranges between 1 and 0 (ie 0≤R2≤1). The closer to 1 the better the fit, otherwise the worse the fit.

**3.3.3.2 t-Test of Significance**

The student t-ratio will be used to test the individual statistical significance of the regression co-efficient. A two-tail test is conducted at 5% level of significance and n-k degree of freedom (df), where n is the number of observation and K is the number of parameter(s) estimated.

**Decision Rule:**

The computed (t\*) will be compared with the critical t-value (t0.025). If t\*>t0.025, the Ho will be rejected and H1 will be accepted. Otherwise, Ho is accepted and H1 rejected.

**3.3.3.3 f-Test of Significance**

f-test statistics is used to test the overall statistical significance of the independent variables. A one-tail test will be conducted at 5% level of significance and (V1/V2) degrees of freedom. Where;

V1= degree of freedom (df) for the numerator: v1=k-1.

V2= degree of freedom (df) for the denominator: v2=n-k.

**Decision Rule:**

If the computed f-ratio(f\*) is compared with the critical f-ratio (f0.05 ). If f\*>f0.05, we will reject the null hypothesis and accept the alternative, otherwise, the alternative hypothesis H1 will be rejected and null hypothesis H0 be accepted.

**3.3.4 Econometric Test of Significance (Second Order Test)**

**3.3.4.1 Autocorrelation Test: Autocorrelation Test:** The aim of this test is to examine whether the errors corresponding to different observations are serially correlated or not. Uncorrelated errors are desirable. The Durbin – Watson (D-W) statistics at 5% will be used to test for the presence of autocorrelation problem. The region of no autocorrelation remains:

du< d\* < (4-du)

 Where:

du = Upper Durbin – Watson

d\* = Computed Durbin-Watson

**Decision Rule:**

If the computed value of Durbin-Watson lies within the no autocorrelation region, it means there is no presence of autocorrelation problem. But if the Durbin-Watson computed value lies outside the regions there is the presence of autocorrelation problem. If it occurs, to avoid the spurious regression associated with it, we will employ the Durbin Watson Autocorrelation Correction to remove its influence in the model.

**3.3.4.2 Normality Test:** This study will carry out a normality test to check if the residuals, a proxy for stochastic error term follows normal distribution or not.

Symbolically, u*i*~ N (0, δ2). The normality test that would be used in this study is Jarque-Bera (JB) test of normality.

**Decision Rule:**

If JBtab(2)df is greater than JBcal in absolute values then the residual is normally distributed

**3.3.4.3 Granger Causality Test:** Although regression analysis deals with the dependence of one variable on the other, it does not necessarily imply causation. In other words, the existence of a relationship between variables does not prove causality or the direction of influence (Gujarati, 2004). The essence of causality analysis, using the granger causality test, is to actually ascertain whether a causal relationship exists between two variables of interest. Here is the Granger specification model:

**Decision Rule:**

If the probability value is greater than 0.05, we accept the null hypothesis and if the probability value is less than 0.05, we accept the alternative hypothesis.

**3.4 Data Required and Sources**

The data required for this study are secondary time series data on inflation rate (INFL), interest rate (INTR), commercial bank total loan volume (CBTL) and manufacturing sector output (MOP) ranging from 1981-2015. The data are extracted from the 2016 editions of the Central Bank of Nigeria statistical bulletin and IndexMundi.

**CHAPTER FOUR**

**PRESENTATION AND ANALYSES OF RESULT**

This chapter analyzes the results using various economic, statistical and econometric tests. Thus, the earlier posted hypothesis of this study will be tasted based on the empirical results.

**4.1 The Empirical Results**

As the performance of theoretical postulation is no guarantee, but only an indicator of what we may expect in practice, empirical testing of the time series data of the variables is absolutely necessary.

**4.1.1 Unit Root Test Results**

The Augmented Dickey-Fuller (ADF) was used to test for the unit root in the individual variable. The test was done based on the following hypothesis;

H0: variable is non-stationary

H1: variable is stationary

The results from the Augmented Dickey-Fuller test for unit root are summarized below.

**Table 4.1: ADF Test for Unit Root**

|  |  |  |  |
| --- | --- | --- | --- |
| **VARIABLES** | **ADF test** **Statistics** | **5% critical** **Value** | **Order of** **Integration** |
| MOP | -8.539745 | -1.952910 | I(2) |
| INFL | -5.349848 | -2.954021 | I(1) |
| CBTL | -2.138687 | -1.955681 | I(2) |
| INTR | -8.056414 | -2.954021 | I(1) |

From the tabular illustration, all the variables are not stationary at level form, while manufacturing output (MOP)and commercial bank total loan (CBTL) are stationary at second difference that is, they are integrated at order two; I(2). While inflation rate (INFL) and interest rate (INTR) are stationary at first difference.

 Not having a stationary time series data indicates not having a short run relationship among the individual time series data, this result is expected since most macro- economic time series data are known to exhibit such behavior.

 Since our variables are non-stationary at level form, there is need to conduct a co-integration test. The essence is to show that although all the variables are non-stationary, the variables may have a long term relationship that is, and the variables may be co-integrated and will not produce a spurious result.

**4.1.2 Co-integration Test Result**

According to (Gujarati 2004) a regression involving non-stationary time series variables will produce a spurious (non-meaningful) result. But if such variables are co-integrated, having long run relationship, the result will therefore be acceptable. Econometrically speaking, two variables will be co-integrated if they have a long run equilibrium relationship between them (Gujarati, 2004:822)

To test for co-integration among the variables, we will carry out ADF test on the regression residuals as proposed by Gujarati (2004). The ADF unit root test on the residuals work with the same decision rule as unit root test.

The co-integration test result is summarized as follows:

**Table 4.2: Co-integration Test Result**

|  |  |
| --- | --- |
| Null Hypothesis: ECT has a unit root |  |
| Exogenous: Constant, Linear Trend |  |
| Lag Length: 3 (Automatic based on SIC, MAXLAG=8) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -8.495009 |  0.0000 |
| Test critical values: | 1% level |  | -4.309824 |  |
|  | 5% level |  | -3.574244 |  |
|  | 10% level |  | -3.221728 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(ECT) |  |  |
| Method: Least Squares |  |  |
| Date: 06/02/18 Time: 06:24 |  |  |
| Sample (adjusted): 1987 2015 |  |  |
| Included observations: 29 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| ECT(-1) | -4.264915 | 0.502049 | -8.495009 | 0.0000 |
| D(ECT(-1)) | 3.330575 | 0.415426 | 8.017259 | 0.0000 |
| D(ECT(-2)) | 3.663214 | 0.457835 | 8.001171 | 0.0000 |
| D(ECT(-3)) | 2.464669 | 0.383121 | 6.433140 | 0.0000 |
| C | -172.5981 | 80.29491 | -2.149552 | 0.0423 |
| @TREND(1981) | 12.33742 | 4.330230 | 2.849138 | 0.0091 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.795645 |     Mean dependent var | -38.83730 |
| Adjusted R-squared | 0.751220 |     S.D. dependent var | 282.7241 |
| S.E. of regression | 141.0166 |     Akaike info criterion | 12.91762 |
| Sum squared resid | 457370.4 |     Schwarz criterion | 13.20051 |
| Log likelihood | -181.3055 |     Hannan-Quinn criter. | 13.00622 |
| F-statistic | 17.90989 |     Durbin-Watson stat | 2.043564 |
| Prob(F-statistic) | 0.000000 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

From the result above, the ADF test statistics (-8.495009) is greater than the 5% critical value (-3.574244) in absolute terms. This implies that the residuals are stationary (i.e. the variables are co-integrated or that the linear influence of the independent variables cancels out).

**4.1.3 Error Correction Mechanism Result**

**Table 4.3: ECM Test Result**

|  |  |  |
| --- | --- | --- |
| Dependent Variable: LOG(MOP) |  |  |
| Method: Least Squares |  |  |
| Date: 06/02/18 Time: 06:47 |  |  |
| Sample (adjusted): 1984 2015 |  |  |
| Included observations: 32 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| INFL | 0.008520 | 0.004554 | 1.870706 | 0.0719 |
| LOG(CBTL) | 0.778491 | 0.034696 | 22.43759 | 0.0000 |
| INTR | 0.067612 | 0.011806 | 5.727029 | 0.0000 |
| ECT(-1) | -0.000233 | 0.000513 | -0.454136 | 0.6532 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.950271 |     Mean dependent var | 6.438734 |
| Adjusted R-squared | 0.944943 |     S.D. dependent var | 1.761145 |
| S.E. of regression | 0.413240 |     Akaike info criterion | 1.186890 |
| Sum squared resid | 4.781475 |     Schwarz criterion | 1.370107 |
| Log likelihood | -14.99025 |     Hannan-Quinn criter. | 1.247622 |
| Durbin-Watson stat | 1.253297 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

 From table 4.3 above, the magnitude of the short run disparity is0.000233, that is to say the degree of the short run dynamics is 0.0233%. This shows a relatively very low speed of adjustment to equilibrium after a shock.

**4.2 Regression Result**

In the regression result, the variables under consideration are manufacturing sector output (MOP) (dependent variable), inflation rate [INFL], commercial bank total loan [CBTL] and interest rate [INTR]. From the result the estimated coefficient value of bo, b1, b2, and b3 are1.997628, 0.000289, 0.731724and -0.012694 respectively.

The regression result is presented below;

|  |  |  |
| --- | --- | --- |
| Dependent Variable: LOG(MOP) |  |  |
| Method: Least Squares |  |  |
| Date: 06/02/18 Time: 06:50 |  |  |
| Sample (adjusted): 1982 2015 |  |  |
| Included observations: 34 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 1.997628 | 0.146056 | 13.67717 | 0.0000 |
| D(INFL) | 0.000289 | 0.003586 | 0.080556 | 0.9363 |
| LOG(CBTL) | 0.731724 | 0.023018 | 31.78866 | 0.0000 |
| D(INTR) | -0.012694 | 0.012009 | -1.057101 | 0.2989 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.971507 |     Mean dependent var | 6.260237 |
| Adjusted R-squared | 0.968658 |     S.D. dependent var | 1.854441 |
| S.E. of regression | 0.328304 |     Akaike info criterion | 0.720376 |
| Sum squared resid | 3.233501 |     Schwarz criterion | 0.899948 |
| Log likelihood | -8.246394 |     Hannan-Quinn criter. | 0.781615 |
| F-statistic | 340.9676 |     Durbin-Watson stat | 0.349842 |
| Prob(F-statistic) | 0.000000 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**TABLE 4.4: Result of A prior Test**:

|  |  |  |  |
| --- | --- | --- | --- |
| **VARIABLES** | **EXPECTED SIGNS** | **OBSERVED SIGNS** | **RESULTS** |
| MOP | +VE | +VE | CWES |
| INFL | -VE | +VE | DCWES |
| CBTL | +VE | +VE | CWES |
| INTR | -VE | -VE | CWES |

CWES – conform with expected sign

DCWES – doesn’t conform with expected sign

**4.3 Evaluation of Regression Results**

**4.3.1 Evaluation Based on Economic Criterion**

This subsection is concerned with evaluating the regression result based on a priori expectations. The signs and magnitude of each variable coefficient is evaluated against theoretical expectations.

The signs of some of the variable coefficient are not exactly in line with a priori expectations. Inflation rate (INFL) and commercial bank total loan (CBTL) have a positive relationship with manufacturing sector output (MOP), while interest rate has a negative relationship with manufacturing sector output.

The constant term is estimated at 1.997628 which mean that the model passes through the point 1.997628 mechanically, if the independent variables are zero, manufacturing sector output would be 1.997628 (Gujarati and Sangeetha, 2007).

The estimated coefficient for inflation rate (INFL) is 0.000289; this implies that if we hold all other variables affecting manufacturing sector output constant, a unit increase in inflation rate will lead to a 0.000289 increase in manufacturing sector output on the average. Likewise, the estimated coefficient of interest rate (INTR) is-0.012694, this means that holding every other variable that affect manufacturing sector output constant, a unit increase in Interest Rate will bring about a 0.012694 decrease in manufacturing sector output. However, the estimated coefficient for commercial bank total loan (CBTL) is 0.731724; this means that a unit increase in commercial bank total loan will bring about a 0.731724 increase in manufacturing sector output.

**4.3.2 Evaluation Based On Statistical Criterion**

This subsection applies the R2, the t-test and the f-test to determine the statistical reliability of the estimated parameters. These tests are performed as follows;

**4.3.2.1 R2 –Result and Interpretation**

The coefficient of determination R2 from the regression result, the R2 is given as 0.971507 this implies that 97.1507% of the variation in manufacturing sector output is being explained by the variation in inflation rate, Interest Rate and commercial bank total loan.

**4.3.2.2 t–Test Result and Interpretation**

From the distribution table, t0.025, 33= 2.042

The result of the t-test of significance is shown in table 4.5 below:

The result of the t-test is presented below and evaluated based on the critical value (2.042) and the value of calculated t-statistics for each variable.

**Table 4.5: Result of t-Test of Significance**

|  |  |  |  |
| --- | --- | --- | --- |
| **VARIABLES** | **t-computed (t\*)** | **t-tabulated (t/2)** | **Conclusion** |
| INFL | 0.080556 | 2.042 | Insignificant |
| CBTL | 31.78866 | 2.042 | Significant |
| INTR | -1.057101 | 2.042 | Insignificant |

Significant (Reject Ho; accept H1),

Insignificant (Accept Ho).

From the t- test result above, For INFL, t\*<t/2, therefore we accept null hypothesis. Hence inflation rate is statistically insignificant thus inflation rate has an insignificant impact on manufacturing sector output.

For CBTL, t\*>t/2therefore we accept alternative hypothesis. Hence commercial bank total loan is statistically significant thus commercial bank total loan has significant impact on manufacturing sector output.

For INTR, t\*< t/2therefore we accept null hypothesis. Hence interest rate is not statistically significant thus interest rate has no significant impact on manufacturing sector output.

**4.3.2.3 Result and Interpretation of F–Test of Significance**

v1=4-1=3, V2=34-4=30, df=(3,30) at 5% level of significance and df=(3,30), f0.05= 2.92 and F\*=340.9676. Since f\*> f0.05, we reject the null hypothesis and conclude that the variables (INFL, CBTL and INTR)have joint inference on manufacturing sector output.

**Table 4.6: Result of f-Test of Significance:**

|  |  |  |
| --- | --- | --- |
| **Computed f-ratio value** | **Critical f-ratio value** | **Result** |
| 340.9676 | 2.92 | Statistically significant |

**4.3.3 Evaluation Based on Econometric Criterion**

 In this subsection, the following econometric test is used to evaluate the result obtained from our model: autocorrelation, normality and granger causality test.

**4.3.3.1 Result and Interpretation of Autocorrelation Test**

Using the durbin-watson statistics, the region of no autocorrelation (positive or negative) is given as follows

du< d\*< (4-du)

du= 1.74

d\*= 0.349842

(4-du)= 4 – 1.74= 2.26

By substitution, the region becomes:

1.74>0.349842< 2.26

|  |  |  |  |
| --- | --- | --- | --- |
| Du | d\* | 4-du | Result |
| 1.74 | 0.349842 | 2.26 | Autocorrelation present |

The result shows that there is the presence of autocorrelation problem in the model as the computed durbin Watson statistics did not fall within the zero autocorrelation region.

**4.3.3.2 Normality Test Result and Interpretation**

The Normality test will be done using the Jaque-Berra test of normality. Jaque-Berra test of normality is hinged on the hypothesis that K is close to or exactly 3 and S is close to or exactly o, thus making the JB value close to or equal to O, which is the condition for normal distribution it will also be tested using the probability value, if the probability is less than 0.05, the null hypothesis will be accepted but if the probability value is higher than 0.05, the alternative hypothesis will be accepted.

**Table 4.7 Result of Normality Test**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Skewness** | **Kurtosis** | **Jarque-berra** | **Probability** | **Test** |
| -0.147031 | 2.039813 | 1.428609 | 0.489532 | ND |

ND- Normally Distributed

**Conclusion:**

From the normality table, the Jaque-Berra draw close to zero (0) as stated, in order words the residual are normally distributed. Also, the probability value is greater than 0.05; therefore, the alternative hypothesis is accepted.

**4.3.3.3 Granger Causality Test: Result and Interpretation**

**Table 4.8: Result of Causality Test:**

|  |
| --- |
| Pairwise Granger Causality Tests |
| Date: 06/02/18 Time: 07:21 |
| Sample: 1981 2015 |  |
| Lags: 2 |  |  |
|  |  |  |  |
|  |  |  |  |
|  Null Hypothesis: | Obs | F-Statistic | Prob.  |
|  |  |  |  |
|  |  |  |  |
|  INFL does not Granger Cause MOP |  33 |  0.14127 | 0.8689 |
|  MOP does not Granger Cause INFL |  9.20996 | 0.0008 |
|  |  |  |  |
|  |  |  |  |
|  CBTL does not Granger Cause MOP |  32 |  0.42149 | 0.6603 |
|  MOP does not Granger Cause CBTL |  2.07823 | 0.1447 |
|  |  |  |  |
|  |  |  |  |
|  INTR does not Granger Cause MOP |  33 |  6.89489 | 0.0037 |
|  MOP does not Granger Cause INTR |  0.45997 | 0.6360 |
|  |  |  |  |
|  |  |  |  |
|  CBTL does not Granger Cause INFL |  32 |  0.25148 | 0.7795 |
|  INFL does not Granger Cause CBTL |  0.54844 | 0.5842 |
|  |  |  |  |
|  |  |  |  |
|  INTR does not Granger Cause INFL |  33 |  1.33913 | 0.2783 |
|  INFL does not Granger Cause INTR |  1.70386 | 0.2003 |
|  |  |  |  |
|  |  |  |  |
|  INTR does not Granger Cause D(CBTL |  32 |  0.08633 | 0.9175 |
|  CBTL does not Granger Cause INTR |  0.00991 | 0.9901 |
|  |  |  |  |
|  |  |  |  |

From the granger causality result, a unidirectional causal relationship exists between inflation rate (INFL) and manufacturing sector output(MOP), also no causality relationship exists between manufacturing sector output (MOP) and commercial bank total loan (CBTL), interest rate(INTR) and manufacturing sector output (MOP) also granger cause each other as well (unidirectional causality).

**4.4Evaluation of Research Hypotheses**

**4.4.1 Hypotheses three**. from the t-Test result, we accept the null hypotheses for inflation rate (INFL) and interest rate (INTR), which is that interest rate and inflation rate have no significant impact on the manufacturing sector output of Nigeria, while we accept the alternative hypothesis for commercial bank total loan volume which implies that commercial bank total loan volume has significant impact on manufacturing sector output.

**4.4.3 Hypotheses four-** from the granger causality test result, inflation rate and interest rate have unidirectional causal relationship with manufacturing sector output of Nigeria; we therefore accept the alternative hypotheses. While we accept the null hypothesis for commercial bank total loan, since zero causality exists between commercial bank total loan and real manufacturing sector output of Nigeria.

**4.4 Implication of the Results**

The result of this study indicates that inflation rate and interest rate have insignificant impact on the manufacturing sector output of Nigeria; while commercial bank total loan has significant impact on manufacturing sector output of Nigeria; this implies that inflation rate and interest rate are insignificant variables for determining the manufacturing sector output of Nigeria while, commercial bank total loan is a significant variable for determining manufacturing sector output in Nigeria.

 Also, inflation rate and commercial bank total loan has a positive relationship on the manufacturing sector output of Nigeria; this implies that an increase in the values of the inflation rate and commercial bank total loan of the country will bring about an increase in the manufacturing sector output of Nigeria. This is inconsistent with our a priori expectation. On the other hand, interest rate has a negative relationship with manufacturing sector output of Nigeria; this implies that an in increase in the value of interest rate will bring about a decrease in the manufacturing sector output of Nigeria.

 Furthermore, the result indicates that, no causal relationship (zero causality) exists between commercial bank total loan and manufacturing sector output of Nigeria, while a unidirectional causal relationship exists between inflation rate, interest rate and manufacturing sector output in Nigeria.

 This implies that the past values of commercial bank total loan cannot be used in forecasting the future values of manufacturing sector output in Nigeria, also the past values of manufacturing sector output cannot be used in forecasting the future values of commercial bank total loan in Nigeria. While past values of inflation rate cannot be used to forecast the future value of manufacturing sector output, the past value of manufacturing sector output can be used in forecasting the future value of inflation rate. Also, the past values of interest rate can be used in forecasting the future values of manufacturing sector output but the past values of manufacturing sector output cannot be used in forecasting the future values of interest rate.

**CHAPTER FIVE**

**SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION**

**5.1 Summary of Findings**

This study builds a model to examine the impact of interest rate on the manufacturing sector output in Nigeria for the period 1981-2015 while incorporating other variables that affect manufacturing sector output such as commercial bank total loan and inflation rate. To carry out this research work, annual time series data on manufacturing sector output, interest rate, inflation rate and commercial bank total loan for the period 1981-2015 were collected.

 The overall result of the research work shows that, interest rate and inflation rate have insignificant impact on the manufacturing sector output in Nigeria, while commercial bank total loan have significant impact on the manufacturing sector output in Nigeria.

 The findings of this study further indicates that commercial bank total loan and inflation rate have a positive relationship with manufacturing sector output of Nigeria; the result also indicated that interest rate has a negative relationship with manufacturing sector output of Nigeria.

 The granger causality finding shows a unidirectional causal relationship between interest rate, inflation rate and manufacturing sector output in Nigeria. It also shows zero causal relationship between manufacturing sector output and commercial bank total loan in Nigeria.

**5.2 Conclusion**

From the foregoing, the researcher therefore conclude that interest rate and inflation rate has no significant impact on manufacturing sector output in Nigeria, while commercial bank total loan has a significant impact on manufacturing sector output in Nigeria. We also conclude that there is a unidirectional causality relationship between interest rate, inflation rate and manufacturing sector output in Nigeria. Zero causal relationship between manufacturing sector output and commercial bank total loan in Nigeria

**5.3 Recommendations**

Owing to the findings of this research work above, the following recommendations are therefore formulated and the government and other necessary authorities are advised to adhere to them in order to increase the manufacturing sector output of Nigeria.

1. The Central Bank of Nigeria and other monetary authorities should reduce the interest rate being charged on loans borrowed from the commercial banks through the reduction of bank rate and other deposit requirements of the commercial banks in order to make funds available to the manufacturing sector of the country which will increase its output.
2. Haven seen that inflation rate has a positive relationship with manufacturing sector of the economy, the authorities in charge of formulating the stabilization policies of the country should formulate policies which keeps inflation at a bearable position which will increase the volume of spendable cash in the hands of individuals who will patronize the manufacturing sectors and increase their output.

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**APPENDIX I**

**Time series data on manufacturing sector output (in billion naira), inflation (in %), commercial bank total loan (in billion naira) and interest rate (in %) from 1981 to 2015**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  YEAR | MOP(# billion) | INFL(%) | CBTL (# billion) | INTR(%) |
| 1981 | 26.89 | 20.81 | 8.5829 | 10 |
| 1982 | 29.09 | 7.7 | 10.2753 | 11.75 |
| 1983 | 31.13 | 23.21 | 11.0939 | 11.5 |
| 1984 | 27.12 | 17.82 | 11.5036 | 13 |
| 1985 | 37.14 | 7.44 | 12.1702 | 11.75 |
| 1986 | 38.65 | 5.72 | 15.7016 | 12 |
| 1987 | 43.22 | 11.29 | 17.5319 | 19.2 |
| 1988 | 63.52 | 54.51 | 19.5612 | 17.6 |
| 1989 | 72.90 | 50.47 | 22.008 | 24.6 |
| 1990 | 84.27 | 7.36 | 26.0001 | 27.7 |
| 1991 | 110.60 | 13.01 | 31.3062 | 20.8 |
| 1992 | 153.47 | 44.59 | 42.7368 | 31.2 |
| 1993 | 221.23 | 57.17 | 65.6653 | 36.09 |
| 1994 | 354.66 | 57.03 | 94.1839 | 21 |
| 1995 | 414.13 | 72.84 | 144.5696 | 20.79 |
| 1996 | 477.95 | 29.27 | 169.4371 | 20.86 |
| 1997 | 546.71 | 8.53 | 385.5505 | 23.32 |
| 1998 | 620.20 | 10 | 272.8955 | 21.34 |
| 1999 | 713.82 | 6.62 | 322.7649 | 27.19 |
| 2000 | 826.03 | 6.93 | 508.3022 | 21.34 |
| 2001 | 989.11 | 18.87 | 796.1648 | 30.19 |
| 2002 | 1,127.23 | 12.88 | 954.6288 | 22.88 |
| 2003 | 1,304.07 | 14.03 | 1210.0331 | 20.82 |
| 2004 | 1,516.05 | 15 | 1519.2427 | 19.49 |
| 2005 | 1,778.73 | 17.86 | 1976.7112 | 18.7 |
| 2006 | 2,082.49 | 8.24 | 2524.2979 | 18.36 |
| 2007 | 2,401.19 | 5.38 | 4813.4888 | 18.7 |
| 2008 | 2,761.55 | 11.58 | 7799.4001 | 22.62 |
| 2009 | 3,170.82 | 11.54 | 8912.1431 | 22.51 |
| 2010 | 3,578.64 | 13.72 | 7706.4304 | 22.42 |
| 2011 | 4,527.45 | 10.84 | 7312.726 | 23.79 |
| 2012 | 5,588.82 | 12.22 | 8150 | 24.69 |
| 2013 | 7,233.32 | 8.48 | 10005.594 | 25.74 |
| 2014 | 8,685.43 | 8.06 | 8489.4 | 26.71 |
| 2015 | 8,973.77 | 9.02 | 8881.7 | 26.3 |

**Sources: CBN statistical bulletin 2016 and Index Mundi**

**APPENDIX II**

**MOP UNIT ROOT TEST RESULT**

|  |  |
| --- | --- |
| Null Hypothesis: D(MOP,2) has a unit root |  |
| Exogenous: None |  |  |
| Lag Length: 3 (Automatic based on SIC, MAXLAG=8) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -8.539745 |  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(MOP,3) |  |  |
| Method: Least Squares |  |  |
| Date: 06/02/18 Time: 06:07 |  |  |
| Sample (adjusted): 1987 2015 |  |  |
| Included observations: 29 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| D(MOP(-1),2) | -3.086046 | 0.361375 | -8.539745 | 0.0000 |
| D(MOP(-1),3) | 2.615275 | 0.382227 | 6.842199 | 0.0000 |
| D(MOP(-2),3) | 3.639901 | 0.507627 | 7.170422 | 0.0000 |
| D(MOP(-3),3) | 2.623100 | 0.429012 | 6.114279 | 0.0000 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.748906 |     Mean dependent var | -39.83655 |
| Adjusted R-squared | 0.718775 |     S.D. dependent var | 282.9906 |
| S.E. of regression | 150.0718 |     Akaike info criterion | 12.98755 |
| Sum squared resid | 563038.3 |     Schwarz criterion | 13.17614 |
| Log likelihood | -184.3194 |     Hannan-Quinn criter. | 13.04661 |
| Durbin-Watson stat | 1.685564 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX III**

**INFL UNIT ROOT TEST RESULT**

|  |  |
| --- | --- |
| Null Hypothesis: D(INFL) has a unit root |  |
| Exogenous: Constant |  |  |
| Lag Length: 0 (Automatic based on SIC, MAXLAG=8) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -5.349848 |  0.0001 |
| Test critical values: | 1% level |  | -3.646342 |  |
|  | 5% level |  | -2.954021 |  |
|  | 10% level |  | -2.615817 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(INFL,2) |  |  |
| Method: Least Squares |  |  |
| Date: 06/02/18 Time: 06:10 |  |  |
| Sample (adjusted): 1983 2015 |  |  |
| Included observations: 33 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| D(INFL(-1)) | -0.950175 | 0.177608 | -5.349848 | 0.0000 |
| C | 0.059250 | 2.844209 | 0.020832 | 0.9835 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.480048 |     Mean dependent var | 0.426364 |
| Adjusted R-squared | 0.463275 |     S.D. dependent var | 22.29545 |
| S.E. of regression | 16.33398 |     Akaike info criterion | 8.483064 |
| Sum squared resid | 8270.767 |     Schwarz criterion | 8.573762 |
| Log likelihood | -137.9706 |     Hannan-Quinn criter. | 8.513581 |
| F-statistic | 28.62088 |     Durbin-Watson stat | 1.873426 |
| Prob(F-statistic) | 0.000008 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX IV**

**CBTL UNIT ROOT TEST RESULT**

|  |  |
| --- | --- |
| Null Hypothesis: D(CBTL,2) has a unit root |  |
| Exogenous: None |  |  |
| Lag Length: 8 (Automatic based on SIC, MAXLAG=8) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -2.138687 |  0.0338 |
| Test critical values: | 1% level |  | -2.664853 |  |
|  | 5% level |  | -1.955681 |  |
|  | 10% level |  | -1.608793 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(CBTL,3) |  |  |
| Method: Least Squares |  |  |
| Date: 06/02/18 Time: 06:15 |  |  |
| Sample (adjusted): 1992 2015 |  |  |
| Included observations: 24 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| D(CBTL(-1),2) | -4.586281 | 2.144438 | -2.138687 | 0.0493 |
| D(CBTL(-1),3) | 3.682624 | 2.053359 | 1.793464 | 0.0931 |
| D(CBTL(-2),3) | 3.090004 | 2.078685 | 1.486518 | 0.1579 |
| D(CBTL(-3),3) | 2.485676 | 1.903667 | 1.305730 | 0.2113 |
| D(CBTL(-4),3) | 2.429202 | 1.807022 | 1.344313 | 0.1988 |
| D(CBTL(-5),3) | 2.159989 | 1.787334 | 1.208498 | 0.2456 |
| D(CBTL(-6),3) | 1.869317 | 1.514250 | 1.234483 | 0.2360 |
| D(CBTL(-7),3) | 0.768509 | 1.835403 | 0.418714 | 0.6814 |
| D(CBTL(-8),3) | 2.618577 | 1.580343 | 1.656967 | 0.1183 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.910370 |     Mean dependent var | 79.46583 |
| Adjusted R-squared | 0.862567 |     S.D. dependent var | 1723.590 |
| S.E. of regression | 638.9673 |     Akaike info criterion | 16.03758 |
| Sum squared resid | 6124189. |     Schwarz criterion | 16.47935 |
| Log likelihood | -183.4510 |     Hannan-Quinn criter. | 16.15478 |
| Durbin-Watson stat | 2.159024 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX V**

**INTR UNIT ROOT TEST RESULT**

|  |  |
| --- | --- |
| Null Hypothesis: D(INTR) has a unit root |  |
| Exogenous: Constant |  |  |
| Lag Length: 0 (Automatic based on SIC, MAXLAG=8) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -8.056414 |  0.0000 |
| Test critical values: | 1% level |  | -3.646342 |  |
|  | 5% level |  | -2.954021 |  |
|  | 10% level |  | -2.615817 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(INTR,2) |  |  |
| Method: Least Squares |  |  |
| Date: 06/02/18 Time: 06:17 |  |  |
| Sample (adjusted): 1983 2015 |  |  |
| Included observations: 33 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| D(INTR(-1)) | -1.352971 | 0.167937 | -8.056414 | 0.0000 |
| C | 0.619641 | 0.808369 | 0.766532 | 0.4492 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.676766 |     Mean dependent var | -0.065455 |
| Adjusted R-squared | 0.666339 |     S.D. dependent var | 7.994617 |
| S.E. of regression | 4.617961 |     Akaike info criterion | 5.956475 |
| Sum squared resid | 661.0924 |     Schwarz criterion | 6.047173 |
| Log likelihood | -96.28184 |     Hannan-Quinn criter. | 5.986992 |
| F-statistic | 64.90580 |     Durbin-Watson stat | 2.166624 |
| Prob(F-statistic) | 0.000000 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX VI**

**COINTEGRATION TEST RESULT**

|  |  |
| --- | --- |
| Null Hypothesis: ECT has a unit root |  |
| Exogenous: Constant, Linear Trend |  |
| Lag Length: 3 (Automatic based on SIC, MAXLAG=8) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -8.495009 |  0.0000 |
| Test critical values: | 1% level |  | -4.309824 |  |
|  | 5% level |  | -3.574244 |  |
|  | 10% level |  | -3.221728 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(ECT) |  |  |
| Method: Least Squares |  |  |
| Date: 06/02/18 Time: 06:24 |  |  |
| Sample (adjusted): 1987 2015 |  |  |
| Included observations: 29 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| ECT(-1) | -4.264915 | 0.502049 | -8.495009 | 0.0000 |
| D(ECT(-1)) | 3.330575 | 0.415426 | 8.017259 | 0.0000 |
| D(ECT(-2)) | 3.663214 | 0.457835 | 8.001171 | 0.0000 |
| D(ECT(-3)) | 2.464669 | 0.383121 | 6.433140 | 0.0000 |
| C | -172.5981 | 80.29491 | -2.149552 | 0.0423 |
| @TREND(1981) | 12.33742 | 4.330230 | 2.849138 | 0.0091 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.795645 |     Mean dependent var | -38.83730 |
| Adjusted R-squared | 0.751220 |     S.D. dependent var | 282.7241 |
| S.E. of regression | 141.0166 |     Akaike info criterion | 12.91762 |
| Sum squared resid | 457370.4 |     Schwarz criterion | 13.20051 |
| Log likelihood | -181.3055 |     Hannan-Quinn criter. | 13.00622 |
| F-statistic | 17.90989 |     Durbin-Watson stat | 2.043564 |
| Prob(F-statistic) | 0.000000 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX VII**

**ECM TEST RESULT**

|  |  |  |
| --- | --- | --- |
| Dependent Variable: LOG(MOP) |  |  |
| Method: Least Squares |  |  |
| Date: 06/02/18 Time: 06:47 |  |  |
| Sample (adjusted): 1984 2015 |  |  |
| Included observations: 32 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| INFL | 0.008520 | 0.004554 | 1.870706 | 0.0719 |
| LOG(CBTL) | 0.778491 | 0.034696 | 22.43759 | 0.0000 |
| INTR | 0.067612 | 0.011806 | 5.727029 | 0.0000 |
| ECT(-1) | -0.000233 | 0.000513 | -0.454136 | 0.6532 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.950271 |     Mean dependent var | 6.438734 |
| Adjusted R-squared | 0.944943 |     S.D. dependent var | 1.761145 |
| S.E. of regression | 0.413240 |     Akaike info criterion | 1.186890 |
| Sum squared resid | 4.781475 |     Schwarz criterion | 1.370107 |
| Log likelihood | -14.99025 |     Hannan-Quinn criter. | 1.247622 |
| Durbin-Watson stat | 1.253297 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX VIII**

**REGRESSION RESULT**

|  |  |  |
| --- | --- | --- |
| Dependent Variable: LOG(MOP) |  |  |
| Method: Least Squares |  |  |
| Date: 06/02/18 Time: 06:50 |  |  |
| Sample (adjusted): 1982 2015 |  |  |
| Included observations: 34 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 1.997628 | 0.146056 | 13.67717 | 0.0000 |
| D(INFL) | 0.000289 | 0.003586 | 0.080556 | 0.9363 |
| LOG(CBTL) | 0.731724 | 0.023018 | 31.78866 | 0.0000 |
| D(INTR) | -0.012694 | 0.012009 | -1.057101 | 0.2989 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.971507 |     Mean dependent var | 6.260237 |
| Adjusted R-squared | 0.968658 |     S.D. dependent var | 1.854441 |
| S.E. of regression | 0.328304 |     Akaike info criterion | 0.720376 |
| Sum squared resid | 3.233501 |     Schwarz criterion | 0.899948 |
| Log likelihood | -8.246394 |     Hannan-Quinn criter. | 0.781615 |
| F-statistic | 340.9676 |     Durbin-Watson stat | 0.349842 |
| Prob(F-statistic) | 0.000000 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX IX**

**NORMALITY TEST RESULT**

**APPENDIX X**

**GRANGER CAUSALITY TEST RESULT**

|  |
| --- |
| Pairwise Granger Causality Tests |
| Date: 06/02/18 Time: 07:21 |
| Sample: 1981 2015 |  |
| Lags: 2 |  |  |
|  |  |  |  |
|  |  |  |  |
|  Null Hypothesis: | Obs | F-Statistic | Prob.  |
|  |  |  |  |
|  |  |  |  |
|  INFL does not Granger Cause MOP |  33 |  0.14127 | 0.8689 |
|  MOP does not Granger Cause INFL |  9.20996 | 0.0008 |
|  |  |  |  |
|  |  |  |  |
|  CBTL does not Granger Cause MOP |  32 |  0.42149 | 0.6603 |
|  MOP does not Granger Cause CBTL |  2.07823 | 0.1447 |
|  |  |  |  |
|  |  |  |  |
|  INTR does not Granger Cause MOP |  33 |  6.89489 | 0.0037 |
|  MOP does not Granger Cause INTR |  0.45997 | 0.6360 |
|  |  |  |  |
|  |  |  |  |
|  CBTL does not Granger Cause INFL |  32 |  0.25148 | 0.7795 |
|  INFL does not Granger Cause CBTL |  0.54844 | 0.5842 |
|  |  |  |  |
|  |  |  |  |
|  INTR does not Granger Cause INFL |  33 |  1.33913 | 0.2783 |
|  INFL does not Granger Cause INTR |  1.70386 | 0.2003 |
|  |  |  |  |
|  |  |  |  |
|  INTR does not Granger Cause CBTL |  32 |  0.08633 | 0.9175 |
|  CBTL does not Granger Cause INTR |  0.00991 | 0.9901 |
|  |  |  |  |
|  |  |  |  |