AN ASSESSMENT OF THE SMALL AND MEDIUM SCALE ENTERPRISES EQUITY INVESTMENT SCHEME (SMEEIS) IN NIGERIAN DIARY AND MILK PROCESSING COMPANIES

BY

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DECLARATION

I hereby declare that this dissertation titled " An Assessment of Small and Medium Scale Enterprises Equity Investment Scheme in Nigerian Diary and Milk Processing Companies" is product of my own research effort undertaken under the supervision of Prof. MansurIdris and has not been presented elsewhere for the award of any degree or certificate. All the sources of the materials used have been duly acknowledged in the references. Any error, either by omission or commission, was unintentional and is highly regretted.

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CERTIFICATION

Thisis to certify that this thesis is carried out by *(Mohammed Abdullahi Sani SPS/11/MEC/00016)* under the supervision of;

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DEDICATION

This research work is dedicated to father,Alhaji Abdullahi Ibrahim Namowa,and mother,Hindatu Abdullahi Bala, in particular,and the entire Alhaji Ibrahim Namowa family.

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ABSTRACT

The study seeks to empirically investigate and assess the impact of the small and medium scale enterprise equity investment scheme with specific reference to Nigerian Diary and Milk Processing Companies in Nigeria. The study utilizes time series models and descriptive tools to describe the data generating process. The study examined the stochastic properties of the data with a view to describing the information contained in the data. The study used time series quarterly data spanning from 2001 to 2014 and utilizes average manufacturing capacity utilization, loan to small and medium enterprises and the lending rate to small and medium enterprises as the proxy variables for the research. It subjects the variables to the unit root test and the result revealed the presence of a different order of integration. Hence, the Pesaran and Shin (2001) cointegration test was conducted with a view to finding the long run relationship among the variables used in the study. The results showed that the strengths of linear shock among the variables, though significant, are rather weak and positive. For this, it implies that, a unit shock in the lending rate (which is a proxy for the investment scheme) has a positive and significant impact on the manufacturing capacity utilization of small and medium enterprises. The study recommends that the scheme should be strengthened and improved in terms of its coverage and capacity to impact on the small and medium scale diary industries.

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Background to the Study

Nigeria has the potential of being a major milk producer in Africa due to its large population of headsmen (Fulani) and large heads of cattle, especially within the North West, North Central and NorthEast parts of the country. It has been suggested that if improved methodsof thestoring, processing, packaging and transportation of milk are employed, outputcan be raised substantially for internal use, as well as for export. Nigeria is also said to be the largest producer of cow milk in West Africa and the third in Africa (Michael, et al 1991).

On the other hand the Small and Medium Scale Enterprises Equity Investment Scheme (SMEEIS) was a voluntary initiation of the Bankers committee, which at its 246th meeting held on 21st December, 1999, required all commercial and merchant banks to commit 10 percent of their Profit After Tax to the financing/funding of the equity of Small and Medium Scale Industries (SMIs) in Nigeria. The 10% of the Profit After Tax (PAT) to be set inside annually shall be invested in small and medium enterprises as the banking industry's contribution to the Federal Government efforts towards stimulating economic growth, the development of local technology and generating employment. According to theCentral Bank of Nigeria 2003, there is a very low level of awareness among the target beneficiaries of the small and medium enterprises equity investment scheme. For example, out of fifteen (15) non-beneficiaries contacted, eighty (80) percent were unaware of the existence of the scheme.

The fund to be provided under the scheme shall be in the form of equity investment within eligible enterprises and/or loans at a single digit interest rate in order to reduce the burden of interest and other financial charges under normal bank lending as well as provide financial advisory, technical and management support from the banking industry. Every legal business activity is covered under the scheme with the exception of trading, merchandizing, and financing services (SMEEIS guideline 2003).

The ultimate aim of this scheme is to facilitate the flow of funds for the various sectors of the Nigerian economy for which diary and milk processing companies would require forfinancing their investments. The purpose is to help in mobilizing funds for the establishment of new small and medium scale industries (SMIs), stimulate economic growth, development of local technology and generate employment in Nigeria(Sanusi, 2004).

Therefore, the importance of diary and milk processing companies under the scheme is very vital. This is because they provide a market for the locally produced agricultural output, employment creation, theprovision of milk needed for domestic consumption and the generation of income for most of the Nigerian workforce (Futa, 1982).Despite their importance, diary and milk processing companies in Nigeria have been facing problems, which include financial, managerial and high costs of operation. This research work intends to find out the impact of the scheme on the growth and development of diary and milk processing companies in Nigeria.

1.2 Statement of the Research Problem

Given the importance ofSmall and Medium Scale Enterprises as a catalyst or engine that facilitates the growth and development of Nigeria economy, government has in the past introduced various credit schemes since early 1970s in a bid to boost the flow of credit to Small and Medium Scale Industries (SMIs) with diary and milk processing industry inclusive. These schemes range from the Small Industries Credit Scheme (SSICS) introduced in 1971 to the establishment of a development bank(Nigeria Bank for Commence and Industry (NBCI)) in 1970s. Others are the introduction of Credit Guidelines on Rural Banking by Central Bank of Nigeria (CBN) both in 1979 and in 2002, respectively. Other Programs/Schemes include the National Economic Reconstruction Fund (NERFUND) in 1989and the Small and Medium Scale Enterprises and equity Investment Scheme (SMEEIS) in 1999.

Despite the introduction of these schemes,the diary and milk processing companies subsector is unable to yield the desired capacity utilization. This may be due to inadequate funding, poor infrastructural facilities and lack of technical knowhow as well as high rates of interest on loans. Other researchers have identified other problems faced by diary and milk processing industries to include inadequate funding, poor infrastructure, unfavorable government policies, lack of technical knowhow and high interest rates(Aftab and Rahim 1998, Ekpenyong 1983. It is in view of these challenges that the researcher chooses to assess the impact of SMEEIS with particular reference to Diary and Milk Processing Companies in Nigeria.

From the above statement of research problem, we can summarize our research questions as follows:

i. What has been the impact of Small and Medium Scale Enterprises Equity Investment Scheme (SMEEIS) on the growth of diary and milk processing companies in Nigeria?
ii. What has been the contribution of diary and milk processing companies to the Gross Domestic Product (GDP) of Nigeria?
iii. How has SMEEISimpacted on diary and milk processing companies in Nigeria?
iv. What are the factors militating against the smooth access of SMEEIS funds by the diary and milk processing companies?

1.3 Objectives of the Study

The broad objective of this research is to assess the impact of Small and Medium Scale Enterprises Equity Investment Scheme on diary and milk processing companies in Nigeria.

Other specific objectivesincludes:

i. To assess the impact of SMEEISon the growth of diary and milk processing companies in Nigeria.
ii. To determine the contribution of diary and milk processing companies to the Gross Domestic Product (GDP) in Nigeria
iii. To assess how SMEEIS haveimpacted on diary and milk processing companies in Nigeria.
iv. To identify the factors militating against the smooth access of SMEEIS funds by the diary and milk processing companies in Nigeria.

1.4 Statement of Hypothesis

Research of this nature needs hypotheses to be formulated and tested. The following hypotheses stated in alternative form will be tested:

H_O: Small and Medium Scale Enterprises Equity Investment Scheme (SMEEIS) funds do not have a significant impact on Diary and Milk processing Companies capacity utilization in Nigeria.

H_I: Small and Medium Scale Enterprises Equity Investment Scheme (SMEEIS) funds have a significant impact on Diary and Milk processing Companies capacity utilization in Nigeria.

H_O: There is no long-run relationship between Small and Medium Scale Enterprises Equity Investment Scheme (SMEEIS) funds and Milk processing Companies capacity utilization Nigeria.

H_I: There is long-run relationship between Small and Medium Scale Enterprises Equity Investment Scheme (SMEEIS) funds with diary and Milk processing Companies in Nigeria.

H_O: There is no causal relationship between Small and Medium Scale Enterprises Equity Investment Scheme (SMEEIS) funds and Milk processing Companies capacity utilization in Nigeria.

H_I: There is a causal relationship between Small and Medium Scale Enterprises Equity Investment Scheme (SMEEIS) funds and Milk processing Companies capacity utilization in Nigeria.

1.5 Scope and Limitations

This research work covers Small and Medium Scale Enterprises Equity Investment Scheme (SMEEIS) introduced by Bankers Committee with emphasis on Diary and Milk processing Companies in Nigeria. The study is for a period of fourteenyears, which is represented by 52 quarters. The use of quarterly data is justified by the fact that the annual data for this type of research could be less reliable.Afundamental limitation of a research of this nature is the quality and availability of accurate data,the time frame covered by the scheme andthe inconsistency of the data by its source.To overcome this and account for the possible data inconsistency problema weighted and transformed data is used, which is subjected to the analysis of time series.

1.6 Significance of the Study

This research work is significant because it will provide a clear understanding of the impact of Small and Medium Scale Enterprises Equity Investment Scheme (SMEEIS) on diary and milk processing industry in Nigeria at large. It will also provide answers to the basic questions asked about financing/funding, contribution, problems, factors militating against SMIs to access SMEEIS funds,as well as exposing the economic significance of diary and milk processing companies in Nigeria. The research will help policy makers to come up with a more realistic blue print for the implementation of SMEEIS in Nigeria.

Beside that, the research would add to the volume of the literature existing in the field of SMEEIS. Hence, it would be useful to Lecturers, students of economics and finance and agricultural finance experts.

1.7 Organization of the Study

This research work is divided in to five chapters. Chapter two covers a definition of concepts and a literature review comprising theoretical literature, empirical literature and the gap identified in the reviewed literatures. Chapter three of this work is the research methodology comprising sources of data, the technique of data analysis, apriori expectation, model specification and causality test. Chapter four is data presentation, analysis and discussion. While chapter five covers summary, conclusion and policy recommendations.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

There is large body of literature on financing investment projects(Jorgenson and Siebent 1988). In this study, three main literatures sources are considered in the work, mainly conceptual literature, theoretical literature and empirical literature.

2.2 Conceptual Review

According to the Central Bank of Nigeria (2004), Small and Medium Scale Industries are defined based on the number of employees and the amount of the capital invested. Looking at the Small and Medium Scale Enterprises Equity Investment Scheme (SMEEIS) as a concept, it is referred to as a scheme which was initiated by the Bankers' Committee in 1999 aimed at addressing some of the constraints that Small and Medium Scale Industries (SMIs) faced (CBN survey 2003).

2.2.1 Small Scale Enterprises

According to Jimah (1970).The definition of small scale industry varies with the culture and peculiar circumstances of the person attempting the definition. Studies on small scale enterprises identify more than fifty different definitions in seventy-five countries. The small scale business act passed by the United States Congress in 1953 stated that "A small business is one which is independently owned and operated and not dominant in it field of operation" (Amienghomwan, 2004). In Greet Britain, the standard definition of small business is a business with an annual turnover of two million pounds sterling or less with less than two hundred paid employees.

In Nigeria, the multiplicity of the definitionsis quite apparent. The Nigeria Bank for Commerce and Industry (1990) defines a small-scale enterprise as one whose capital does not exceed N750, 000 whereas the federal government in 1973 viewed small scale industries to include all trading and manufacturing units with a total capital investment up to N60, 000 and paid employees of up to fifty persons (Ikharehon, 2002). The industrial research unit of the ObafemiAwolowo University defines the small scale enterprise as one “whose total assets in equipment, plant and working capital are less than N250,000 and employing fewer than fifty, full-time workers” (Banmbach 1992). While the Central Bank of Nigeria’s (CBN) operational guidelines in 1988 defined small scale enterprises with reference to two financial areas:- the merchant banks and commercial banks) it states, “for lending purpose of merchant banks a small scale enterprise is one with a minimum annual return of N500,000”.According to the Central Bank of Nigeria 2004, Small Scale firms are the firms whose projects are worth up to 1.50 million Naira (excluding land but including working capital), together with an employed workforce of 11 – 100 persons.

2.2.2 Medium Scale Enterprises

According to the baseline economic survey of Small and Medium Scale (SMIs), medium scale firms are firms whose capital investment is of over 50 million Nairabut not more than 200 million Naira (excluding land but including working capital) and employ a workforce of 100 – 300 persons (ABU Zaria Base Line Economic survey 2005).The figure below shows the classification of Small and Medium Scale Enterprises (SMIs) by employment and assets, from different organizations.

Table 2.1: Classification Of SMEs by Employment and Asset

Employment Based Classification:

Organization	**Micro Enterprises**	**Small Enterprises**	**Medium Enterprises**
International Finance Organization	< 10	10 – 50	50 – 100
Central Bank of Nigeria (CBN)	-	< 50	< 100
National Association of Small and Medium Scale Industries	-	< 40	-
Accenture	-	< 50	< 500

Source: InternationalFinanceCorporation(IFC) Publications (2015).

From Table 2.1, SMEs are classified based on employment across various organizations. International Finance classifies SMEs with respect to employee as Micro, Small and Medium based on number of employees with less than 10, 10-50, and 50-100, respectively. For the Central Bank of Nigeria, SMEs are classified as small and medium with employees less than 50 and less than 100, respectively. While Accenture classify SMEs as small and medium with less than 50 and 500, respectively.

Table 2.2: Asset based (excluding real estate) classification:

Organization	**Small Enterprises**	**Medium Enterprises**
IEC	< $ 2.5 million	-
CBN	<₦1 million	<₦150 million
MASSI	<₦ 40 million	-

Federal Ministry of Industry (FMI)	<₦ 50 million	<₦ 200 million
National Economic Reconstruction Fund (NERFUND)	N/A	N/A

Source: International Finance Corporation (IFC) Publications (2015).

From the Table above SMEs are classified based on asset, excluding land and real estate across various organizations. IEC classifies SMEs with respect to asset as Small enterprises with asset worth less than ₦2.5million. For the Central Bank of Nigeria, SMEs are classified as small enterprises and medium enterprises with asset worth less than ₦1million and ₦150million, respectively. While the Federal Ministry of Industry classifies SMEs as small and medium enterprises with asset worth less than ₦50million and ₦200million, respectively.

2.2.3 An Overview of Diary and Milk Processing Industry and Its Classification in Nigeria

Dairy industry implies the production, the processing and the distribution of milk and milk products. By this definition, the industry is yet to be fully developed in this country and in other West African countries. There is a need develop the industry because there is a high demand for milk and dairy products due to increasing population and increasing knowledge on nutrition. However, there must be trained personnel to collect, process and distribute the milk while there must be a continuous supply of milk to sustain the demand of the markets. The dairy schemes in Nigeria can be classified into three categories viz: those whose herds are settled, those whose herds are unsettled and those without herds (World Bank 1992).

Dairy Schemes Whose Herds are Settled: Settled dairy schemes are those whose establishments are highly organized and permanent on one site. Most settled dairy schemes are government owned. Dairy schemes in this category are the urban dairies, dairies on schools of Agriculture, universities and vocational institutions (World Bank 1992).

Dairy Schemes Whose Herds are Unsettled: These are schemes, which do not maintain a farm for rearing cows. Under these schemes, a dairy is built with milk collection Centre in central areas to the kraal. Milk is purchased from the herds men who are predominantly Fulanis and Shuwa Arab tribesmen. The milk is subjected to physical and chemical tests for acceptability. The milk is then transported to the dairy processing centre some kilometers away where it is pasteurized and soldas liquid milk, cheese, butter and yoghurt. Schemes that follow this pattern include the Ilorin Milk Pilot Project.The Dairy is built in Ilorin and the milk is collected from a distance of 10km radius. Ilorin milk pilot project was equipped with modern equipment donated by the UNICEF. Pasteurised milk, butter and yoghurt are made from the milk so purchased. Others are Kaduna Dairy, Kano Dairy, Maiduguri Dairy and BirninKebbi Dairy (World Bank 1992).

Dairies Without Herds: This is the scheme without herds called the 'Plants'. These are dairies, which depend upon importation for their raw materials. They include;

Rural DairySchemes: The most important and the least developed is milk production from local semi-nomadic herds scattered throughout the country. The development of local production of milk among these semi-nomadic herdsmen constitutes the rural dairy scheme. A milk production survey revealed that the main breeds used are Keteku, Bunaji (WF) and Ndama breeds. The Fulanis (cattle rearers) who by nature are superstitious and secretive would not release accurate figures of the breed as well as accurate milk production figures. Bush grazing rather than established pastures is the rule. Early in the morning, the cows are tethered down to suckle the calvesfora few minutes before the cows are milked (World Bank 1992).

The animals are later driven to graze in the bush. A distance of 8 km daily may be covered in search of water and good grass. In the dry season, the distance may be longer. After gazing, they returned to kraal in the evening where they are tethered down to suckle after which they are hand milked by the housewife. The milk is collected in a calabash and handed over to the housewife. Milk production is higher in the rains than in the dry season. Milking is done twice daily. In the rains, the average yield of a cow per day is 3 star beer bottlefuls 1.5 litres) while in the dry season, halfis the yield. Thus, the average yield per cow per day under Fulani management 1 litre while the same breedcanproduce4litresunderimprovedmanagement (World Bank 1992).

2.2.4 Diary and Milk Processing Companies in Nigeria

Urban Dairies: Urban dairies are dairies that are established near the city to supply milk and milk products. They consist of the farm and the processing centre . High yielding cows, like the foreign breeds of Holstein, Brown Swiss, Jersey and their crosses (exotic indigenous crosses) are kept. An urban dairy is usually equipped with pasteurizing, refrigeration and packaging equipment. Milking is usually by machine while in modern farms, equipmentare employed for farm operations. Urban dairies in the country Include the

Agege Dairy: The oldest dairy farm in Nigeria, established in 1942. It was formally a beef station to serve the army during the secondworld war. On this farm began the pioneer work, which provided information for the policy and execution of most dairy projects in the country (FAO 1988).

IkoroduDairy: It started in 1965 with the aim of investigating how dairying can be profitably integrated into the general farm programme thereby practicing mixed farming. By 1972, this objective changed because the farm institute in which the dairy was situated became a School of Agriculture (FAO 1988).

Ikenne Dairy: This was originally Dairy Herd Multiplication Centre for the purpose of breeding and selecting the breeds of exotic cattle for distribution to government stations. In1967, about 100 animals of various exotic breeds (Holstein, Brown Swiss and Jersey) were imported from U.S.A. The project was not well financed and it had to close down.

Other urban dairies under plan were Sokoto, Benin, Port-Harcourt, Calabar, Shika, Samaru, Nsukka etc. Universities and Schools of Agriculture Dairies were for Teaching and Research e.g. Universities of Ibadan and Ife (now ObafemiAwolowo University). Many urban dairies were under construction in almost every state for most part of 1970s. However, a decision could not be arrived at as to which particular breed would be best suited to the environmental conditions of this country. In spite of all the commitments, urban dairies could not make much impact on the milk consuming market in Nigeria (FAO 1988).

SAMCO (Swedish African Milk Company). It is basedin Mushin, LagosState. Foundedin 1959. It importsmaterials like dried whole milk or skim milk powder, butterfat, flavouring, colouring and sweetening agents for recombined milk and milk products (FAO 1988).

FAN MILKat Eleyele, Ibadan, Oyo Statefounded in 1960. It was founded by a Danishmerchant (FAO 1988).

WAMCO (West African Milk Company), founded in 1974. It has a recombining plant. It is different from SAMCO and FAN in that its milk is packed in tins, whereas SAMCO and FAN MILK pack their products in cartoons. Friesland found WAMCO. He combines local production with imports from the Netherlands (FAO 1988).

2.3 Theoretical Literature

There is a large body of literature on financing investment projects. Jorgenson and Siebent (1968) for instance, compared five alternative theories of inducement to invest, namely: neoclassical I, neoclassical II, accelerator, expected profit and liquidity theories of investment.

2.3.1 The Neoclassical Investment Theory

According to neoclassical investors, the desire to reap capital gain is largely explained by their current investment behavior. A capital gain is the realized increase in the monetary value of an asset. Capital gain tends to arise when demand for the asset is to exceed supply over a period of a time. Examples of assets in which capital gains might be expected to accrue over real estate are property, works of arts and stocks and shares.

This theory emphasizes that it is the anticipated long term real capital appreciation and not short term changes in the monetary values of the asset that induce investment spending. According to this theory, monetary capital gains can and arise even when there is no circular movement in demand and supply relationships, especially during inflation periods. Capital gain derived from inflation is, therefore, not necessarily real gains but mere book entry adjustments.

2.3.1.0The Implications of the assumption set for the neoclassical investment theory

The combined effects of these assumptions help to give the neoclassical investment theory its defining characteristics. The assumption that owners and managers are identical agents settles the otherwise contentious problem of specifying a preference function for the firm itself. Most important, it eliminates the embarrassing possibility that ownership and management will have conflicting objectives and conflicting attitudes toward risk. It thus sustains the neoclassical vision by helping to assure the optimal coordination and synchronization of the real and financial sectors.

In the neoclassical financial theory, management concerns itself only with the expected value of the distributions of expected future returns on prospective investment projects, not with other moments. The discount rate it applies to these expected returns does reflect perceived risk, but it is risk as evaluated "from the financial investor's viewpoint" and not from its own (Brealey and Myers, 1988). In typical neoclassical macroeconomic investment models, on the other hand, the firm is formally assumed to be risk-neutral. Risk enters the model through the cost of capital, a variable that is determined in financial markets and is thus exogenous to the firm. In either case, there is no role for an autonomous enterprise preference function.

In the absence of managerial autonomy, the suppliers of financial capital to the firm exercise sovereignty over the accumulation process. They do have utility functions, of course, and are, in general, risk-averse. It is their job to evaluate expected corporate cash flows with different risk characteristics, decide on optimal leverage ratios, diversify portfolios so as to maximize expected utility and achieve risk-return efficiency and determine the cost of capital to the enterprise. The enterprise then passively implements the investment strategy its owners have chosen. A necessary condition for the validity of the neoclassical assertion that financial agents do their job optimally is the assumption that they have perfect knowledge of the stochastic future. The conflation of ownership and management and the neoclassical treatment of uncertainty thus helps to create the ethereal world of the Modigliani-Miller theorem and of Gordon's propositions (3) and (4). Neither dividend policy nor the degree of leverage of the firm has any effect on its investment decision, a proposition that "holds under reasonably general conditions"Blanchard and Fischer, (1989). There is no room for Minsky's "financial fragility" hypothesis here.

The assumption of liquid physical capital or reversible investment makes the central conclusions of the neoclassical investment theory insensitive to the moderate relaxation of the other assumptions. With liquid capital, it would make little difference to the character of theinvestment theory if the firm itself were risk-averse, because investment would not be very risky. And it would not matter much if the firm had less than complete information about future states of the economy, because with reversible investment and reversible debt, mistakes would be relatively costless.

2.3.2 The Acceleration Theory of Investment

Thomas Nixon Carver and Albert Aftalion developed the accelerator theory early in the twentieth century, among others. Although this theory was conceived before Keynesian economics, it emerged just as the Keynesian theory came to dominate the economic mindset of the twentieth century.According to this theory, investment takes desired capital to be proportional to output as a possible explanatory of variable investment expenditure. This theory is based on the fact that the demand for capital goods is derived from the demand for consumer goods, which the former held to produce.The multiplier-accelerator that captures induced consumption and investment for the aggregated economy would be:

$$\mu^* = \frac{1}{1-c-kg} \quad \text{..............1.1}$$

A similar formula can be derived for our multi-sector economy.Input-output and SAM present with a great detail the interindustry transaction matrix, $[T]_{n,n}$. It gives information about the intermediate inputs required by each industry to sustain its actual level of production. [1] We have computed the matrices of induced consumption [*C′*] and induced investment [*I′*]. Adding them up we obtain the enlarged transaction matrix [T^*]: [2]

$$T^* = T + C' + I' \quad \text{...........1.2}$$

Dividing by the total output of each industry we obtain the "economic matrix" [A^*], whose cells are equal or greater than the usual technical matrix [*A*].

$$A^* = T^* \cdot \hat{q}^{-1} \quad \text{..........1.3}$$

[1] We have assumed that *T* matrix included, as well, fixed capital consumption. In practice this is not the case so we should compute the matrix of capital consumption by goods and industries before adding it to intermediate consumption.

[2] We remind that for the purposes of this section, all the matrices should contain only domestic purchases. The dimension of all these matrices is $n{\cdot}n$, so we can omit the subscripts and the square brackets.

Now we compute:

$$MQ = \left[I - A^{*}\right]^{-1} \quad \text{.........1.4}$$

MQ is the multiplier-accelerator of the total or gross output we where looking for. Each column j informs us about the direct and indirect effects of a unitary expansion of industry j over the output of all the industries that provide resources to j. The provision may be in a direct or an indirect way and the "resources" are defined in the broadest sense so to include intermediate goods, final consumption goods to attend the consumption stemmed from the new incomes and fixed capital goods to expand capacity at the required rate.

Total output involves the usual problem of double counting. Researchers usually are more interested in obtaining the dragging effects on net income. We can compute it by pre-multiplying [*MQ*]by the diagonal matrix $\hat{v}$, which indicates, for each industry, the proportion of value added in total output:

$$MY = \hat{v} \cdot \left[I - A^{*}\right]^{-1} \quad \text{.........1.5}$$

To obtain the multiplier-accelerator of employment, we have to multiply [*MQ*]by the matrix of labor coefficients [*l*]. Each column jof *MQ* informs about the quantities and qualities of the jobs created in the whole system after the unitary expansion of industry j. Again, it accounts for the jobs created in the production of intermediate goods, final consumption goods and fixed capital goods.

$$ML = l \cdot \left[I - A^{*}\right]^{-1} \quad \text{.........1.6}$$

Let us conclude our analysis of the multiplier-accelerator with some notes about its existence and stability. *MQ* exists and is stable provided the addition of the elements of any column of the economic matrix (A^*) is lower than 1. [3] The viability in production assures that columns of matrix of technical coefficients (*A*)are lower than 1. After the introduction of final consumption coefficients in matrix A^+ the condition for stability is not warranted. We have to rule out the possibility that households, via credit, consume systematically more than they earn. After the introduction of investment coefficients we obtain $A^*$and the chances to ensure stability are still lower. The expected rate of growth of demand cannot be whatsoever.

The proof is easier from a macroeconomic standpoint. To get a positive (economically significant) value for the aggregated multiplier-accelerator given in the expected growth of demand should be lower than Harrods's warranted rate.

$$g < \frac{1-c}{k} = \frac{s}{k} \quad \text{..........1.7}$$

The last ratio can be expressed as *s/k* where *s* stands for the part of income systematically saved and *k* for the desired ratio capital / output. If the propensity to consume is reduced to zero, *s* becomes 1 and the maximum rate of growth is 1/*k*, which coincides with Von Neumann's growth rate ($\hat{g}$).

In a multi-sector economycredits allow workers and firms of industry j to consume and invest above the incomes generated in its process of production. Yet, they cannot behave eternally in this way. Credits have to be repaid out of wages and profits. The disaggregated multiplier-accelerator should be derived from where the structures of production, distribution and expenditure keep certain conditions of viability. The application of this instrument is aimed at capturing the normal expansion

[3] This is a sufficient condition.

of industries interrelated via production, consumption and investment. Industries growing at a higher rate should be located in the autonomous demand vector (the "multiplicand"), not in the multiplier-accelerator matrix.

2.3.3 The Expected Profit and Liquidity Theories of Investment

The expected profit theory of investment suggests that profit expectation can best be measured by the market value of the firm, so that desired capital is proportional to market value, while the basic premise of the liquidity theory of investment behavior is that the supply of funds schedule rises sharply at the point where internal funds are exhausted.

Their main conclusion is that the neoclassical incorporates capital gains in the price of capital services and the cost of capital, thereby consulting in the least resident variance over all other theories. By and large, Shapiro (1978), on the other hand, focuses on profits and accelerator theories as adequate methods of determining the investment behavior of firms. The Profit theory argued that investment is defined on the level of aggregate profits and, therefore, on the level of the economy's income.

Hence, there is no single investment theory that can reasonably apply to all forms of investment expenditure. However, for the purpose of industrial financing, there are two basic and critical determinants of the level of net investment spending: the expected rate of net profit, which business hopes to realize from investment spending and the rate of interest. Hence to understand this, we need to review theories of growth and development (Shapiro 1978).

2.3.4 Cobb-Douglas Production Function

In economics, the Cobb-Douglas functional form of production functions is widely used to represent the relationship of an output to inputs. It was proposed by Knut Wicksell (1851 - 1926) and tested against statistical evidence by Charles Cobb and Paul Douglas in 1928.

The function they used to model production was of the form:

$Y (L, K) = AL^{\alpha}K^{\beta}$

Where:

A = total production (the monetary value of all goods produced in a year)

L = labor input (the total number of person-hours worked in a year)

K = capital input (the monetary worth of all machinery, equipment, and buildings)

A = Total factor productivity

$\propto$ and β are the output elasticity's of labor and capital, respectively. These values are constants, determined by available technology (Cobb and Douglas, 1928).Output elasticity measures the responsiveness of output to a change in levels of either labor or capital used in production, ceteris paribus. For example, if $\alpha = 0.15$, a 1% increase in labor would lead to approximately a 0.15% increase in output.

Further, if:

$\alpha + \beta = 1,$

The production function has constant returns to scale. That is, if L and K are each increased by 20%, Y increases by 20%. If

$$\alpha + \beta < 1,$$

Returns to scale are decreasing, and if

$$\alpha + \beta > 1$$

Returns to scale are increasing.

In economics, **total-factor productivity (TFP)** is a variable, which accounts for the effects in total output not caused by inputs. For example, a year with unusually good weather will tend to have higher output, because bad weather hinders agricultural output. A variable like weather does not directly relate to unit inputs, so weather is considered a total-factor productivity variable.

The equation above (the Cobb-Douglasform) represents total output (P) as a function of total-factor productivity (A), capital input (K), labor input (L) and the two inputs' respective shares of output (α is the capital input share of contribution). An increase in either A, K and L will lead to an increase in output. While capital and labor input is tangible, total-factor productivity appears to be more intangible, as it can ranch from technology to knowledge of worker (human capital). The reason why the Cobb-Douglas equation is used in this function is because it exhibits constant return to scale. That is, if we double input, we get a double output.

Technology Growth and Efficiency are regarded as two of the biggest sub-sections of Total Factor Productivity, the former possessing "special" inherent features, such as positive externalities and non-realness, which enhance its position as a driver of economic growth.Total Factor Productivity is often seen as the real driver of growth within an economy and studies reveal that, whilst labour and investment are important contributors, Total Factor Productivity may account for up to 60% of growth within economies.

2.3.5 Harrod's Model Of Growth

Harrods tries to shows in his model how steady (i.e. equilibrium) growth may occur in the economy. Once the steady growth rate is interrupted the economy falls into disequilibrium.The Harrods model is based upon three distinct rates of growth. Firstly, there is the actual growth represented by G., which is determined by the saving ratio and the capital-output ratio. It shows short runs cyclical variations in the rate of growth. Secondly, there is the warranted growth represented by Gw, which is the full capacity growth rate of the income of an economy. Lastly, there is natural growth rate represented by Gn, which is regarded as 'the welfare optimum' by Harrods. It may also be called the potential or the full employment rate of growth.The actual growth rate in theHarrodian model is given by the first fundamental equation as:

$$Gc = s$$

Where:

G: is the rate of growth of output in a given period. And can be expressed as Dy/Y,

c: is the met addition to capital. And can be defined as the ratio of investment to increase in income, i.e. I/DY.

s: is the average propensity to save, i.e S/Y. Substituting these ratios into the above equation, we get

$$DY/Y \times I/DY = S/Y \text{ or } I/Y \Rightarrow I = S$$

Where:

I = Investment

S = Savings (R. F. Harrods)

To capture the potential inconsistencies between investment's dual effects on aggregate demand and the economy's productive capacity, Harrod and Domar specified separate demand and supply sides in their model. Because they wanted to make a fundamental point about the potential dynamic inconsistency between aggregate demand and aggregate supply, not provide a general growth model, they hypothesized a very simple supply side model in which investment was the only contributor to economic growth. They also assumed a production function with a constant marginal product of capital to keep things linear. Harrod and Domar made little effort to justify these assumptions; they wanted to show how investment directly increases productive capacity and not clutter their abstract model with features unrelated to the purpose at hand.

The simple model was convenient for economic planners seeking a specific target growth rate; the formula could be used to justify the foreign aid and government taxation if private domestic saving was not sufficient. In practice, however, the savings rate and the capital-output ratio were almost never constant and development economists quickly found the simple supply-side formula of the Harrod-Domar model to be a very inaccurate predictor of future economic growth. But it is not fair to judge the supply side model as a stand-alone model; Harrod and Domar (1939) intended the simple supply-side equation to be used in combination with a demand side model in order to provide a valuable insight into the dynamic behavior of an economy.

2.3.6 Rostow's Growth Model

In this model, the growth of Agro-allied industries is explained in terms of the developmental stages of a nation's economy. Restow in his book 'The stages of economic growth' identified that for any economy to develop from being a fairly poor agricultural society to a highly industrialized mass-consumption society, it has to go through the five stages of production, which the present developed economies passed through. He argued that it is possible to identify all societies in their economic dimension as lying within one of the five categories, as the traditional society, the preconditions for takeoff, the takeoff, the drive to maturity and the age of high mass consumption (Jinghan, 2000).

He, therefore, concluded that underdeveloped economies need a high level of investment in order to establish the economic infrastructure necessary for takeoff and funds for investment of such kind can be sourced from external borrowing. All the societies, therefore, must pass from the traditional method of production accumulate requisite infrastructure before it can 'take off'.

2.4 Empirical Literature

Roubini and Sala-i. Martin (1992), present a theoretical and empirical analysis of the relationship between policies of financial repression and long term economic growth based in cross section of 98 countries. Their empirical investigation confirmed that after controlling for other determinants of growth. Various measures of financial repression affect growth negatively, and that inflation rates, bank's reserve ratio and growth are negatively related.

De Gregori and Guidotti (1992) examined the empirical relationship between long run growth and the degree of financial development, which was peroxide by the ratio of bank credit to the private sector. They found that this proxy enters positively at a significant level in growth regression on a large cross-sector sample, but negatively when using panel data for Latin America. Such findings suggest that the main channel of the transmission of development to growth is the efficiency of investment, rather than the volume.

Others argued that the analysis of micro-level variable has shed more light in the channels through which financial intermediation affects growth. In a study of 80 countries, Demirguc-Kunt and

Detriguiache (1998) found that banks specific characteristic macro-economic conditions and legal and institutional indicators, among other factors, explained differences in the interest rate margin. Information deficiency and regulatory agency were found to exert a binding constraint on financial intermediary development. These deficiencies were mostly related bad loans on bank balance sheets.

Gertler and Rose (1994) in their analysis identified a linkage between the structure of the finance market and the development of the real sector. Based on two key concepts, a premium for external finance and borrower's net worth, they observed a contraction in the demand for external finance is inversely related to the borrower's net worth and that both jointly determined the level of investment in an economy. In other words, as the real sector grows, the demand for external finance dwindles and the country's net worth increases, thus invigorating investment.

The absence of the necessary infrastructure (legal and insurance) that supports the financial system: the exclusion of credit-worthy small-borrowers on the basis of lack of collateral and the perpetuation of a colonial banking system that grossly discriminates against local borrowers are other acknowledged structural tendencies that continue to explain market fragmentation in most African economies despite the reforms. In order for the financial market to efficiently perform the core role of financial intermediation as well as positively impact on the performance of the economy, certain market efficiencies need to be attained.

Similarly, Okigbo (1981) was of the belief that the financial institutions as an integral part of the financial system should facilitate the achievement of the overall objectives of the economy. These include the provision of efficient banking services and greater mobilization of savings and channeling these saving between surplus and deficit spending units.

However, the problem of the existing Small and Medium Scale Industries (SMIs) of theseven zones in Nigeria, as observed by Base-line Economic Survey of (SMEs) in Nigeria, are infrastructure, source of finance and the level of Small and Medium Scale Enterprise Equity Investment Scheme (SMEEIS) awareness as shown in Table 2.3 below;

Projects of High Investment Potentials in (2004)

1.	Food, Beverage and Tobacco	49	Fruit, diary and milk, drinks, canned food, sugar, beer and stout, table water, vegetable oil, maize flour, etc.
2.	Textile and Footwear	4	Leather shoes, bags, clothing belt yarn
3.	Wood and wood product	3	Furniture, vaneer doors and windows, tooth-picks
4.	Pulp and paper products	2	Stationary and toilet paper
5.	Chemical and pharmaceutical	10	Drugs, laboratory equipment
6.	Metallic and non metallic materials products	2	Cement, iron and steel roofing sheet, gold asbestos, etc.

Source: Baseline Economic Survey 2004

For example in North Central zone there were more small scale than medium scale industries, particularly in food and beverages, iron and steel, textiles and footwear. Basic infrastructures such as electricity, telecommunications, road transport and public water supplies were available, but grossly inadequate. The major sources of finance for most Small

Scale Industries were retained earnings (CBN 2004). The north central zones is endowed with 92 raw materials for the production of various finished goods, out of which 47 are agro-based and 45 and highly quality solid mineral-based, metallic and non metallic. This can be shown in the table below;

S/No	Sector	No of High Investment Projects	Potential Products
1.	Food, Beverage and Tobacco	18	Rice, Maize, Cassava, jam, Melon

2.	Wood and Wood Products	1	Timber and Tambour
3.	Plastic and Rubber Products	1	Rubber
4.	Non-metallic Mineral products	7	Silica sand, clay, grave crude oil, natural gas, etc.

Table 2.4: Projects of High Investment Potentials in South-South Zone (2004)

Source: Baseline Economic Survey 2004

2.5 GAP IN THE LITERATURES

In view of all the literature reviewed, one will find out that it gives an insight on the relationship between financing/funding of diary and milk processing companies and performance in terms of economic growth and development in the other parts of the world and in Nigerian, though there are some missing gaps that these theories/literatures do not explain.Therefore, economic growth as explained by the theories related to the investment, but still economic growth is not only the function of investment as postulated by most of these theories, but other factors, such as political stability, proper institutional functions, favorable atmosphere and other variables that are desirable for businesses to strive. Hence, this study is relevant to explain some of these problems that cannot be explained by the conventional theories. Therefore, this research work is relevant

CHAPTER THREE

RESEARCH METHODLOGY

3.1 Introduction

The statistical techniques employed in the analysis of data are multiple regression econometrics technique and Granger causality to test the causal links ofaverage Manufacturing Capacity *(MC),* Loan to SMEs(*LLM)* and the Interest Rate (*IR)*. This section then contains sources of data, the methods of data analysis, the model specification and the estimation procedure.

3.2 Sources of Data

The study covered the period between 2001 and 2014, which representsa 56quarterly data set on each variable. Secondary data were used in the study and obtained from various publications of the Central Bank of Nigeria (CBN) and the National Bureau of statistics.

3.3 Techniques of Data Analysis

As stated above, the study used the multiple regression econometrics technique and the Granger causality test to analyze the causal links between loan available to SME as a proxy to the amount available to diary and milk processing companies and the interest rate on the loan as well as the average manufacturing capacity utilization.

Also, the impulse response of the Vector Auto Regression (VAR) model was carried out to determine the response of the manufacturing capacity utilization, loan to SMEs and the interest rate. And descriptive tools like tables, ratios and percentages were used in reporting estimated results.

3.4. A-Priori Expectation

It is expected that a positiverelationship should exist between manufacturing capacity utilization and loan to SMEs.Whilea negative relationship should exist between interest rateand manufacturing capacity utilization,respectively.An error term will be included to capture the effects of other variables that affect the dependent variable that cannot be quantified.

3.5 Test ForStationarity

Before our data was used for the analysis, its time series properties were investigated. Hence, a stationary test was carried out to ascertain whether it is an I(O) stationary at level or non-stationary. By definition, a stationary process is one whose joint and conditional distributions are invariant with respect to displacement in time (Pindyck and Rubinfeld, 1988). Stationary is important because if there is non-stationary of the time-series, the classic T-and F-tests are inappropriate.

The problem of nonsense correlation (Yule, 1926) or spurious regression (Granger and Newbold, 1974) may arise where otherwise unrelated series may be presented as related when non-stationary series are used (Adam, 1992). Our test, therefore, would be done using the Augmented Dickey-Fuller (ADF) and the Sargan-Bhargewa Durbin-Watson (SBDW) procedures discussed by Engel and Granger (1987) and Adam (1992) and cited in Aigbokhan (1996).

The ADF is more widely used because it allows for serial correlation in the error term. Here, the observations are firstly tested at levels. To know whether the data is stationary, the value of ADF statistics is compared with the Mackinnon critical values. If an ADF value is greater than the Mackinnon critical value at choosing the levels of significance, say 5 percent, and then we will reject the null hypothesis of non-stationary and conclude that the data is stationary.

3.6 The Unit Root Test

By definition, a stochastic process, Yt, is known as a unit root if its first difference, Yt – Yt –1 is stationary. Thus, testing for a unit root is equivalent to testing whether a stochastic process is stationary or not. Therefore, the presence of a unit root implies that the time series under scrutiny is non-stationary while the absence of a unit root means that the stochastic process is stationary.

$$\Delta Y_t = \mu + \gamma Y_{t-1} + \sum_{j=1}^{p} \alpha_j \Delta Y_{t-j} + \beta t + \omega_t \text{ ....3.1}$$

Where μ is the drift term, t denotes the time trend and p is the largest lag length used. In order to analyze the deterministic trends, we used modified versions of the likelihood ratio tests suggested by Dickey and Fuller (1981). We followed the testing sequence suggested by Patterson (2000), which suggests the following maintained regressions, test statistics and hypotheses:

$$\Delta Y_t = \mu + \gamma Y_{t-1} + \sum_{j=1}^{p} \alpha_j \Delta Y_{t-j} + \beta t + \omega_t \text{ ....3.2}$$

$\hat{\tau}_\beta, H_0 : \gamma = 0, H_a : \gamma < 0; \phi_3, H_0 : \gamma = 0, \beta = 0, H_a : \gamma \neq 0,$ and/or $\beta \neq 0$

$$\Delta Y_t = \mu + \gamma Y_{t-1} + \sum_{j=1}^{p} \alpha_j \Delta Y_{t-j} + \omega_t \text{ ....3.3}$$

$\hat{\tau}_\mu, H_0 : \gamma = 0, H_a : \gamma < 0; \phi_1, H_0 : \mu = 0, \gamma = 0, \beta = 0, H_a : \mu \neq 0,$ and/or $\gamma \neq 0$

$$\Delta Y_t = \gamma Y_{t-1} + \sum_{j=1}^{p} \alpha_j \Delta Y_{t-j} + \beta t + \omega_t \text{ ....3.4}$$

$\tau, H_0 : \gamma = 0, H_a : \gamma < 0$

3.7 Johansen's Procedure

Intuitively, the Johansen test is a multivariate version of the uni-variateADF test. Consider a *reduced form* VAR of order p:

$$y_t = A_1 y_{t-1} + ... + A_p y_{t-p} + Bx_t + u_t \text{..................} 3.6.1$$

Where y_t is a *k*-vector of I(1) variables, x_t is a n-vector of deterministic trends and u_t is a vector of shocks. We can rewrite this VAR as:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + Bx_t + u_t \text{..................} 3.6.2$$

Where $\Pi = \sum_{i=1}^{p} A_i - 1, \Gamma_i = -\sum_{j=t+1}^{p} A_j$

The error correction model (ECM), due to Engel and Granger (1987)[1] and represented by equation (23), is dynamic, involving lags of both the endogenous and exogenous variables. The Π matrix represents the adjustment to disequilibrium following an exogenous *shock*. If Π has reduced rank *r* < *k* where *r* and *k* denote the rank of Π and the number of variables constituting the long-run relationship, respectively. Then there exist two *k*×*c* matrices α and β, each with rank *r,*such that $\Pi = \alpha\beta'$ and $\beta' y_t$ is stationary, *r* is called the *co-integration rank* and each column of β is a co-integrating vector (representing a long-run relationship).[30] The elements of the αmatrix represent the *adjustment* or *loading* coefficients and indicate the speeds of the adjustment of the endogenous variables in response to disequilibrating shocks, while the elements of the Γ matrices capture the short-run dynamic adjustments. Johansen's method estimates the Πmatrix from an unrestricted VAR and tests whether we can reject the restrictions implied by the reduced rank of Π. This procedure relies on the relationships between the rank of a matrix and its characteristic roots (or eigenvalues). The rank of Π equals the number of its characteristic roots that differ from zero, which in turn corresponds to the number of co-integrating vectors. The asymptotic distribution of the Likelihood Ratio (Trace) test statistic for co-integration does not have the usual χ^2 distribution and depends on the assumptions made regarding the deterministic trends.

3.8TheVAR Model

Generally, a VAR Model is specified as:

$$Y_t = m + A_1 y_{t-1} + A_2 y_{t-2} + \cdots A_p y_{t-p} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots..3.7$$

Equation (1) specifies VAR (p) process, where A_i $(i = 1, 2, \ldots.., p)$ are k x k matrices of coefficients, m is a k x 1 vector of constants and ε_t is a vector of white noise process.

The easiest way to appreciate the feature of VAR is to specify a sample VAR. Consider a simple VAR where k= 2 and p=1. This gives:

$$\begin{pmatrix} y_{1t} \\ y_{2t} \end{pmatrix} = \begin{pmatrix} m_1 \\ m_2 \end{pmatrix} + \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix} \begin{pmatrix} y_{1,t-1} \\ y_{2,t-1} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{pmatrix} \ldots\ldots\ldots\ldots\ldots..3.7.2$$

$$y_t = m + Ay_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots..3.7.5$$

More explicitly, this can be written as:

$y_t = m_1 + a_{11}y_{1,t-1} + a_{12}y_{2,t-1} + \varepsilon_{1t}$ ………………..3.7.4

$y_t = m_2 + a_{21}y_{1,t-1} + a_{22}y_{2,t-1} + \varepsilon_{2t}$ ………………..3.7.5

Thus, each variable in VAR is expressed as a linear combination of lagged values of itself and lagged values of all other variables in the group. The behavior of y depends on the properties of the A matrix. If the Eigen values and Eigen vectors of A matrix are:

$$\square = \begin{pmatrix} \lambda_1 & 0 \\ 0 & \lambda_2 \end{pmatrix} \qquad C = \begin{pmatrix} \vdots & \vdots \\ c_1 & c_2 \\ \vdots & \vdots \end{pmatrix}$$

Provided the Eigen values are distinct, the Eigen vectors will be linearly independent and C will be nonsingular. It then follows that;

$$C^{-1}\ AC = and\ A = C\ \ C^{-1} \dots\dots\dots\dots\dots\dots..3.7.6$$

Defining a new vector Z_t as:

$$Z_t = C^{-1}y_t\ or\ y_t = CZ_t \dots\dots\dots\dots\dots\dots..3.7.7$$

The process of pre-multiplying (2) by C^{-1} and simplifying gives:

$$Z_t = m^* + Z_{t-1} + \eta_t \dots\dots\dots\dots\dots\dots..3.7.8$$

Where$m^* = C^{-1}m\ and\ \eta_t = C^{-1}\varepsilon_t$

Thus: $Z_{1t} = m_1^* + \lambda_1 Z_{1,t-1} + \eta_{1t}$

$$Z_{2t} = m_2^* + \lambda_2 Z_{2,t-1} + \eta_{2t} \dots\dots\dots\dots\dots\dots..3.7.9$$

Each Z variable follows a separate AR (1) process and is stationary I (0), if the Eigen value has modulus less than 1; is a random walk with drift I (1), if the Eigen value is 1; and is explosive, if the Eigen value exceeds 1 in numerical value. Finally, it is important to look for the co-integrating relation. Using equation (4), such relation can readily be found. The second bottom row in equation (4) gives:

$$Z_{2t} = c^{(2)}y_t \dots\dots\dots\dots\dots\dots..3.7.10$$

Where $c^{(2)}$ is the bottom row in C^{-1}. Thus, $z_2$is the linear combination of I(1) variables but is itself a stationary I(0) variable. The co-integrating vector annihilates the I(1) component in y_t.

The model of this study is specified as:

$$\Delta MC_t = \sum_{i=1}^{L}\alpha_{11}^{i}\Delta MC_{t-i} + \alpha_{12}^{0}\Delta LLM_t + \sum_{i=1}^{L}\alpha_{12}^{i}\Delta LLM_{t-i} + \alpha_{13}^{0}\Delta IR_t + \sum_{i=1}^{L}\alpha_{13}^{i}\Delta IR_{t-1} + \varepsilon_{1t}.....3.7.11$$

$\Delta LLM_t = \sum_{i=1}^{L} \alpha_{21}^{i} = \Delta LLM_{t-i} + \alpha_{22}^{0}\Delta MC_t + \sum_{i=1}^{L} \alpha_{22}^{i}\Delta MC_{t-i} + \alpha_{23}^{0}\Delta IR_t + \sum_{i=1}^{L} \alpha_{23}^{i}\Delta IR_{t-i} + \varepsilon_{2t}$.....3.7.12

$$\Delta IR_t = \sum_{i=1}^{L} \alpha_{31}^{i}\Delta IR_{t-i} + \alpha_{32}^{0}\Delta MC_t + \sum_{i=1}^{L} \alpha_{32}^{i}\Delta MC_{t-i} + \alpha_{33}^{0}\Delta LLM_t + \sum_{i=1}^{L} \alpha_{33}^{i}\Delta LLM_{t-i} + \varepsilon_{3t}. \ldots .3.7.13$$

Where:

MC is Manufacturing Capacity Utilization, LLM is Loan to SME and IR is Interest Rate.The variables are time series variables and the data sourced from CBN bulletin National Bureau of Statistics respectively.

The VAR model is adopted for this study because of the forecasting power relative to large structural models. Again, one of the common virtues of VAR is that it obviates a decision as to what contemporaneous variables are exogenous. All variables are endogenous.

The study is also interested in capturing the impact of SMEEIS funds on diary and milk processing in Nigeria. A dummy variableD_t was incorporated in the VAR model to show this effect. Therefore, the model will be re-specified as;

$$y_t = m + Ay_{t-1} + D_t + \varepsilon_t$$

$D_t$is a dummy variable that takes the value of either 0 or 1, where a value of 1 indicates that there is a significant impact of Niger Delta militants' activities on oil production in Nigeria, and a value of 0, otherwise.

If the coefficient of the dummy variable is found to be statistically significant, it can then be inferred that the activities of the Niger Delta militants is hampering crude oil production.

3. 9The Granger Causality Test

A common problem in economics is determining whether changes in one variable can cause a change in another. This problem was brought to the fore in analyzing the relationship between the SMEEIS funds, as well as Interest rate and manufacturing capacity utilization in Nigeria. But the causal link could run in either direction. Testing for causality is, therefore, required to shed light on the issue. The Granger causality framework, introduced by Granger (1969) and Sims (1972) was employed for this purpose.

$$Y_t = \sum_{n=1}^{p} A_n X_{(t-p)} + \sum_{n=1}^{p} B_n Y_{(t-p)} + CZ_t + E_t \text{ ....3.7.14}$$

$$X_t = \sum_{n=1}^{p} A_n^{'} Y_{(t-p)}^{'} + \sum_{n=1}^{p} B_n^{'} X_{(t-p)}^{'} + C^{'} Z_t + E_t^{'} \text{ ....3.7.15}$$

X_t and Y_t represent the two time series at time *t*. $X_{(t-p)}$ and $Y_{(t-p)}$ represents the time series at time *t-p and p* the number of lagged time points (order). A_n and $A_n^{'}$ are signed path coefficients. B_n and $B_n^{'}$ are auto regression coefficients. E_t and $E_t^{'}$ are residual. We followed Chen's (Chen et al, 2009) extended Vector Autoregressionmodel, which took the co-variables Z_t at time *t* into account, instead of regressing them out before GCA.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

As stated in the previous chapter, the estimated results are based onthe Autoregressive Distributed Lag (ARDL) co-integration technique and the Vector Autoregressive (VAR) model is applied in the estimation for the dynamic short run response of each endogenous variable, (objectives) with the use of impulse response analysis and forecast error variance decompositions. These results are presented and discussed in this chapter.

4.2 Descriptive Statistics of the Observed Samples

The data collected on manufacturing capacity, interest rate and loans to small and medium scale enterprises from 2001 to 2014 reveal the following descriptive statistics:

Table 4.1: Descriptive Statistics

	IR	LOGMC	LOGLLM
Mean	77.59246	12.64965	10.50896
Median	101.0392	12.74856	10.45606
Maximum	156.7000	13.90429	11.85057
Minimum	3.316600	11.12906	8.742018
Std. Dev.	61.40422	0.821700	0.862804
Skewness	-0.027349	-0.266880	-0.170877
Kurtosis	1.191593	2.018474	1.932389
Jarque-Bera	3.818882	1.456342	1.466021
Probability	0.148163	0.482791	0.480460
Sum	2172.589	354.1902	294.2508
Sum Sq. Dev.	101802.9	18.23017	20.09962
Observations	28	28	28

Source: Researchers computation using EVIEWS Version 8 (2015).

From Table 4.1, the study has 28 observations. The means of all the three variables are significantly different from zero, as revealed by a mean of 77.59 for IR, 12.64 for LOGMC and 10.50 for LOGLLM. The Skewness of the data is negative and the data does not have excess kurtosis, as all the values are less than 3. The Jarque–Berastatistics, which is the measure of normality and derived from the skewness and kurtosis, has probabilities all greater than 0.05, indicating that the data is normally distributed.

4.3: The Unit Root Test

The Augmented Dickey – Fuller (ADF) and Phillips Perron (PP) tests are used in testing the null hypothesis that there is a unit root in a particular time series of interest. This is to check the stationarity and the levels of the integration of each variable. This is shown in Table 4.2:

Table 4.2: Augmented Dickey Fuller (ADF) and Phillip –Perron Unit Root Tests

Variables	**ADF Trend and Intercept**		**Phillip-Perron Trend and Intercept**		**Order of Integration**
	Levels	**1st Difference**	**Levels**	**1st Difference**	
LOGMC	**-2.268354**	**-5.367646**	**-2.170614**	**-5.855950**	**I(1)**
LOGLLM	**-4.234240**	**-**	**-4.654616**	**-**	**I(0)**
IR	**-1.895118**	**-4.192658**	**-2.047329**	**-4.166651**	**I(1)**

Source: Researchers computation using EVIEWS Version 8 (2015).

Table 4.2 presents the results of the unit root test based on the ADF and PP tests. The results obtained provide strong evidence that some of the time series variables are stationary at levels I(0) like Non-oil exports (LOGNO) while others on manufacturing capacity and interest rate are stationary at first different levels I(1). The result showed that all the variables are integrated of order one I (1) except loan to small and medium (LOGLLM), which is integrated at a level that is I(0). Based on this integration order, the Bound Testing method of Co-integration using the ARDL approach is applied. Autoregressive distributed lags method allows us to express the co-integrated behavior of variables, which have a different order of integration. The ARDL procedure is irrespective whether variables used in model are I (0), I (1) or mutually co integrated (Peseran et al., 2001)

4.4 Empirical Results: the ARDL Approach To Co-integration

The model used the ARDL approach of cointegration regression, following the fact that all the variables are not integrated of the same order. The first step in our empirical analysis runs the ARDL Add-ins to estimate the lag length. The result of this test is shown in Table 4.3:

TABLE 4.3: ARDL (1, 1, 1)

ARDL Model	AIC	SC	Log likelihood	F Wald test	P of Wald test
ARDL(1,1,1)	-1.516650	-1.177931	26.71644	0.525930	0.669800
ARDL(1,1,2)	-1.389810	-0.999769	25.37262	0.506092	0.683300
ARDL(1,2,1)	-1.389686	-0.999646	25.37108	0.552050	0.653600
ARDL(1,2,2)	-1.318011	-0.879215	25.47513	0.515982	0.677200
ARDL(2,1,1)	-1.419240	-1.029200	25.74050	0.502298	0.685700
ARDL(2,1,2)	-1.349414	-0.910619	25.86767	0.473520	0.705000

ARDL(2,2,1)	**-1.339266**	**-0.900470**	**25.74082**	**0.454897**	**0.717500**
ARDL(2,2,2)	**-1.269473**	**-0.781923**	**25.86841**	**0.441799**	**0.726500**

Source: Researchers computation (2015), using EVIEWS Version 8.ARDL

The line that delivers satisfactory criterion is colored in Red (bold). The result is presented in Table 3 chooses ARDL (1, 1, 1).The long-run coefficients of the ARDL model are estimated as the second step and the results are reported in Table 4. As discussed, one of the most important issues in applying the ARDL approach is the choice of the order of the distributed lag function. According to Pesaran and Shin (1998), the SBC is generally used in preference to other criteria because it tends to define more parsimonious specifications. For the study model, ARDL (1, 1, 1)where the number represents the lags for each of the variables in the model, is used, as seen in Table 4.3 above. The long-run coefficients of the variables under investigations are shown in Table 4.4.1 below:

4.4.1: The ARDL model (1, 1, 1) for LOGGDP

The long-run coefficients of the model are estimated and the results are reported in Table 4.4with intercept and trend.

Table 4.4: Long –Run Coefficient Estimate

Variable	**Coefficient**	**Std Error** .	**t-Statistics**	**Probability**
C	**5.976912**	**2.275976**	**2.626088**	**0.0171**
@TREND	**0.064588**	**0.027578**	**2.342027**	**0.0309**
D(LOGMC(-1))	**0.026300**	**0.223486**	**0.117683**	**0.9076**

D(LOGLLM(-1))	**0.140951**	**0.132257**	**1.065734**	**0.3006**
D(IR(-1))	**0.001827**	**0.001443**	**1.266445**	**0.2215**
LOGMC(-1)	**-0.390809**	**0.186698**	**-2.093271**	**0.0508**
LOGLLM(-1)	**-0.169051**	**0.174503**	**-0.968757**	**0.3455**
IR(-1)	**-0.001488**	**0.001109**	**-1.341916**	**0.1963**
Durbin-Watson stat		**2.128990**		

Source: Researchers computation using EVIEWS Version 8 (2015).

The diagnoses of the ARDL results indicate the absence of autocorrelation as evident from the Durbin Watson statistics and the Breusch-Godfrey LM results. The *CUSUM test reveals that the model* is dynamically *stable, which is in line with the F-Statistic.*

Normalized Coefficients for the ARDL Model

LLM and MC $-\left[\frac{-0.171613}{-0.382557}\right]$ **= -0.44859**

IR rate and MC $-\left[\frac{-0.001471}{-0.382557}\right]$ **= -0.003845**

The result in Table 4.4.portrays the long-run analyses, which are complimented by the normalized coefficients. The normalize coefficients reveal that loan to small and medium scaleand interest rate management were found to influence economic growth negatively in the long run. It indicates that a unit change in loan to small and medium scale as an external sector development variable decelerates economic growthand retards manufacturing capacity by -0.45%.This finding conforms to the theoretical assumption of a negative relationship between interest rate and investment. This implies that higher interest rare charged on loan given to SME creates a negative stimulant to invest in the sector, which subsequently leads to lower output and growth. Evidently, the current average rate of interest (26%) is too exorbitant for not only SMEs but also for large enterprise.

However, the coefficients are not statistically significant. This implies that the positive relation expected of loan to small and medium scale and exchange rate on manufacturing capacity cannot be completely nullified. The results confirm a negative long-run relationship between and manufacturing capacity and interest rate. This is not in line with the a priori expectations. With the size of less than one percent, they do not contribute positively to economic growth. This is in line with the findings of: Usman and Salami (2008), Olayiwola and Okodua (2009) andAkanegbu (2014), Okpokpo, et al. (2014), who submitted that loan to small and medium scale expansion does not contribute to the rate of economic growth. The reasons may be just that the volume ofloan to small and medium scalein the country has been persistently low over the entire study period, suggesting a need to improve in loan disbursement and interest rate reduction.

4.4.2 Bounds Test Co-integration

To test for the presence of co-integration in the model, the study conducts the Bound Test. This is applied to test whether the long-run coefficients are jointly zero or not. To test if the coefficients of *LOGMC* (-1) *LOGLLM* (-1) and IR (-1) are zero in the estimated ARDL (1, 1, 1) model using the Wald Test, the result is presented in Table 4.5:

Table 4.5: Wald Test Results

Test Statistics	Value	df	Probability
F-statistics	2.493614	(3,19)	0.0910
Chi-square	7.480841	3	0.0581

Source: Researchers computation using EVIEWS Version 8(2015).

The study uses the estimate of the Wald test, which includes both trend and intercept. The value of the study's Wald test computed F-statistic is 2.493614 and there are the (k + 1) = 3 variables (LOGMC, LOGLLM and IR) in model. This value (2.493614) when compared to the Pesaran *et al*. (2001) critical bounds reveals that the computed F-statistic value lies below the lower critical bounds of [4.87, 5.85]. This suggests that no co-integration is possible, by definition. The conclusion is that there is no long-run relationship between LOGMC, LOGLLM and IR.Given the absence of co-integration, ECM is not visible.Thus, the option is to resort to VAR tools of IRF and variance decomposition to capture the short run effects.

4.4.3.1: Shock Transmission between Loan to Small and Medium Enterprises and Manufacturing Capacity.

With the conclusion of no co-integration from the ARDL co-integration approach, the study adopts the VAR approach for subsequent analysis. This analysis is done using the impulse analysis and variance decomposition, which are measures of short-run dynamics of the VAR. The first difference of the series can be estimated by inverting the VAR into a moving average representation after which the impulse response as well as the variance decomposition can be estimated.

4.4.3.2: The Impulse Response Function of Manufacturing Capacity and Loan to SMEs

The Impulse Response Functions (IRFs) are used in this study because many of the variables have linkages to each other: the problem of the non-exogeneity of some of the variables can be taken care of using the IRFs, which capture the endogeneity of the variables. Using CholeskyOrdering (Figure 1) shows that all the interrelationships in the model are captured by VAR. The IRFs show the response of a particular variable to one standard deviation shock on each of the variables in the system. The interpretation of the IRFs takes into consideration the use of first differencing of the variables, since a one-time shock to the first difference in a variable is a permanent shock to the level of that variable. The following conclusions could be drawn from the IRFs results.

Table 4.4.4 presents the result and the fig 4.4.4 as a graphically represented below. It traces the effect of a one standard deviation shock to one of the innovations on current and future values of the endogenous variables.

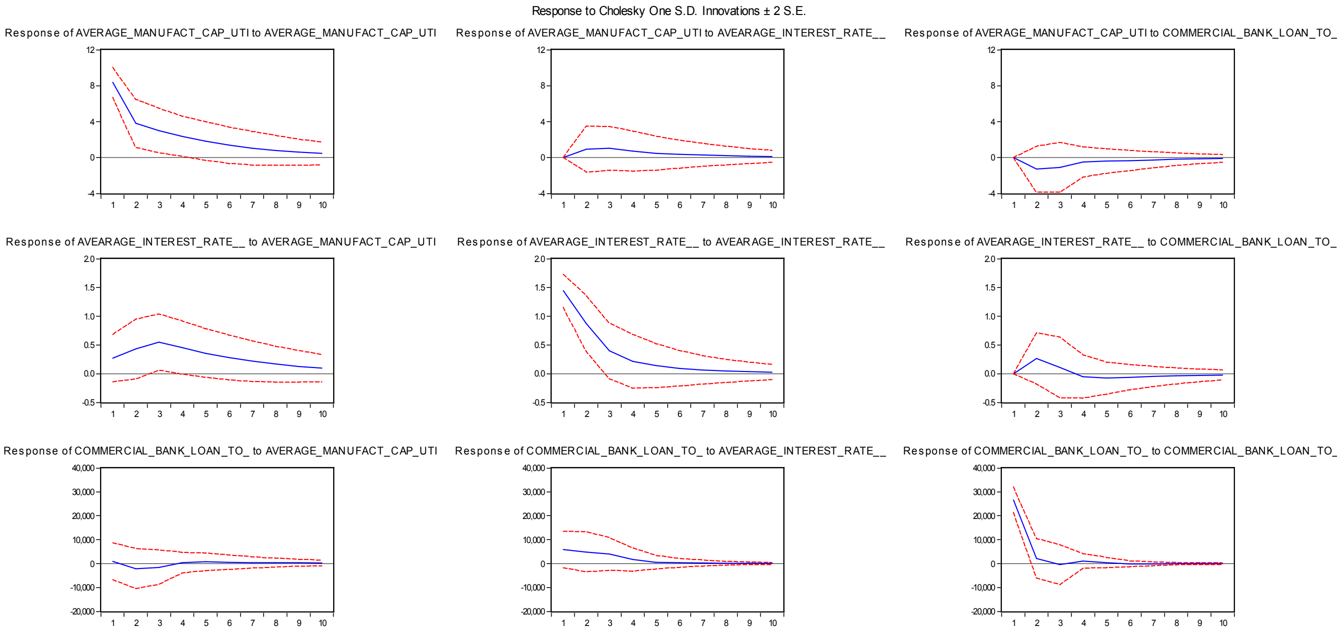
Table 4.4.4: Impulse Response Function

Response of D(LOGMC)			
Period	**D(LOGMC)**	**LOGLLM**	**D(IR)**
1	**0.102368**	**0.000000**	**0.000000**
2	**-0.016312**	**0.002277**	**0.008383**
3	**-0.025806**	**-0.003879**	**-0.009609**
4	**0.006623**	**-0.004610**	**-0.000764**
5	**0.007911**	**-0.002841**	**0.003410**
6	**-0.005440**	**-0.002554**	**4.18E-05**
7	**-0.004098**	**-0.003261**	**-0.001316**

8	**0.000883**	**-0.003206**	**0.000202**
9	**-0.000215**	**-0.002879**	**0.000527**
10	**-0.001989**	**-0.002876**	**-9.83E-05**

Source: Researchers computation using EVIEWS Version 8 (2015).

Figure 4.4.4: Impulse Response Function Graph



The figure reveals the effects of one standard deviation shocks on each of the variables over time. The following conclusions could be drawn from the Impulse Response Functions results in Table4.4.4 and Figure 4.4.4

Shocks from the manufacturing capacity on itself are heavily mixed and fluctuating between negative and positive results over the period. This is not as the theory suggests. Manufacturing capacity is supposed to have a positive influence on itself throughout the period. The gap may be a result of insecurity and political upheavals that have characterized a significant portion of the time frame being examined.Interest rates also have mixed results and impacts on manufacturing capacity. The same reason as above may be applicable in addition to its high volatility in the country.

Responses of manufacturing capacity to the amount of loan to SME and interest rate in Nigeria are negative throughout the accumulated period except in the first two periods. This suggests reactions from non-oil sector on manufacturing capacity are significant in the first two periods only. This shows an increase in the quantity of loan to small and medium scale for the period under review, which does not have any impact on manufacturing capacity in Nigeria.

The null hypothesis of loan to small and medium scale does not impact on manufacturing capacity in Nigeria in the short run is accepted. This is in line with the findings of Usman and Salami (2008),Olayiwola and Okodua (2009), Akanegbu (2014) and Okpokpo, et al. (2014) thatloan to small and medium scale expansion does not contribute to the rate of manufacturing capacity. The reason that may account for the absence of a significant impact of non-oil sector on manufacturing capacity in Nigeria is simply the fact that loan to small and medium scale activities in the country is still very limited and so does not generate much in terms of revenue. As such,loan to small and medium scale cannot, therefore, significantly and positively impact on manufacturing capacity.

All in all, the a priori expectations of positive impact of loan to small and medium scale and interest rate on manufacturing capacity have not been met. Thus, the hypothesis that there is no significant impact of loan to small and medium scale on manufacturing capacity cannot be rejected.

4.4.5 Variance Decomposition

The variance decomposition is estimated so as to see the forecast error components of each of the variable originating from shocks in the system. The ordering of the variables in the variance decomposition is vital. The results of the variance decomposition are presented on table 4.4.5. Evidently, in the 1st period,manufacturing capacity will cause a 100% future variation in itself (own shock). Shocks in manufacturing capacity over the entire period accounts for between 98 to 100% changes in future manufacturing capacity. This is in line with theoretical justifications. Manufacturing capacity utilizations are able to account for an increasing variation in itself (manufacturing capacity), ranging between 0.047 and 0.79 over the entire period. This implies relatively low values in the relationship.

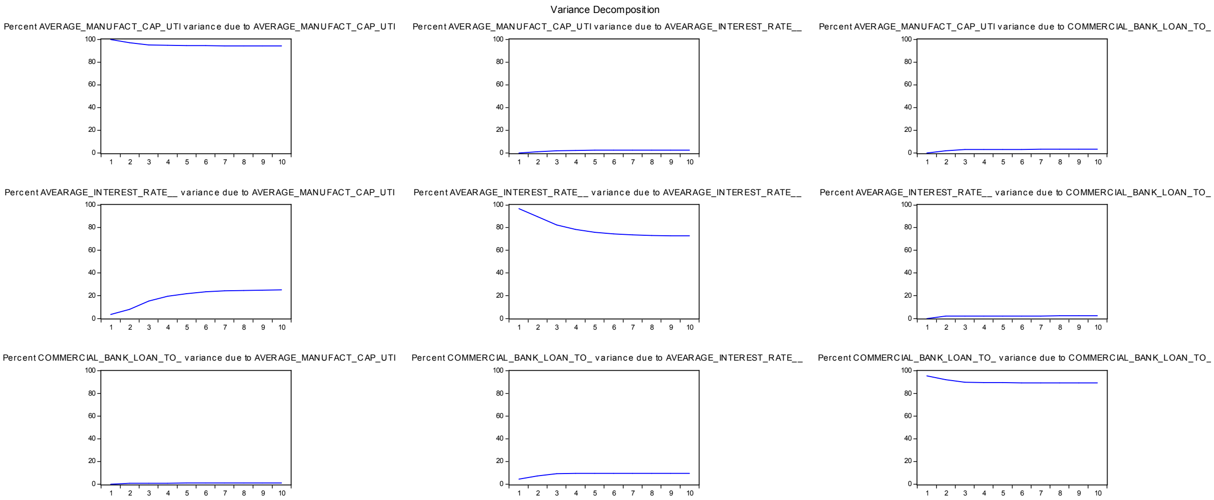
Table 4.4.5 Variance Decomposition of Manufacturing Capacity Utilization

Variance Decomposition of D(LOGGDP)				
Period	S.E.	D(LOGMC)	LOGLLM	D(IR)
1	0.102368	100.0000	0.000000	0.000000
2	0.104023	99.30267	0.047897	0.649435
3	0.107676	98.42307	0.174491	1.402435
4	0.107980	98.24470	0.355751	1.399546
5	0.108361	98.08924	0.422001	1.488762
6	0.108527	98.03971	0.476078	1.484211
7	0.108661	97.93982	0.564971	1.495206
8	0.108713	97.85446	0.651395	1.494147

9	0.108752	97.78361	0.720990	1.495405
10	0.108808	97.71594	0.790122	1.493941

Source: Researchers computation using EVIEWS Version 8 (2015).

Figure 4.4.5.1: Variance Decomposition Graph for LOGMC, LOGLLM AND IR



Source: Researchers computation using EVIEWS Version 8 (2015).

In the 2nd period, manufacturing capacity causes 3.6% future variation in manufacturing capacity. This trend increases continuously with manufacturing capacity recording 3.71 from 4th and 5th periods and 3.72 all through to the 10th period. On the other hand, the exchange rate accounts for 0.67% to 0.69% future variations in manufacturing capacity from the 3rd to the 10th period. By implication, the manufacturing capacity and interest (lending) rate will account for more future variations in manufacturing capacity with time.

From the impulse response function and variance decomposition, manufacturing capacity has a negative impact on manufacturing capacity over the forecast period and accounts for future variations in manufacturing capacity also over the period and the level of impact is less than 1%. Exchange rate has mixed impacts on manufacturing capacity but is predominantly negative. From this it is clear that manufacturing capacity in the short run does not have a significant impact on manufacturing capacity. Thus, the null hypothesis is accepted.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY RECOMMENDATION

5.1 Summary of the Major Findings

In this study, we set out to empirically investigate the extent to which banks loan to the SME sector has impacted on manufacturing output in Nigeria for the period spanning 2001 to 2014 using co-integration and an error correction mechanism (ECM) technique with annual time series covering the period between 2001 and 2014. Some statistical tools are employed to explore the relationship between these variables. The analysis starts with examining the stochastic characteristics of each time series by testing their stationery using Augmented Dickey Fuller (ADF) test and then estimatethe error correction mechanism model.

The study seeks to empirically investigate and assess the impact of the small and medium enterprise equity investment scheme with a specific reference to Nigerian Diary and Milk Processing Companies. For this core objective to be accomplished, the study utilized time series models and descriptive tools to describe the data generating process. The study begins with an empirical investigation by examining the stochastic properties of the data with a view to describing information contained in the data. The study uses time series quarterly data spanning from 2001 to 2014 and utilizes average manufacturing capacity utilization, loan to small and medium enterprises and the lending rate to small and medium enterprises as the proxy variables for the research. The study subjects the variables to the unit root test and result revealed the presence of a different order of integration. Hence, the Pesaran and Shin (2001) co-integration test was conducted with a view to finding the long run relationship among the variables used in the study. The results show that the strengths of linear shock among the variables, though significant, are rather weak and positive. For this, we say that a unit shock in the lending rate (which is a proxy for the investment scheme) has a positive and significant impact on the manufacturing capacity utilization of small and medium enterprises. The study wishes to recommend that the scheme must be strengthened and improved in terms of its coverage and capacity to impact on the small and medium scale diary industries.

5.2 Conclusion

The small and medium scale enterprises sector has been responsible for aiding growth and employment generation in countries like the United States and some Asian and emerging countries of the world. In view of this, this study examined the extent to which banks loan to the SME sector has impacted on manufacturing output in Nigeria for the period spanning 2001to 2014.Based on the regression estimate, it was observed that the effect of bank loan to the SME sector on manufacturing output was insignificant both in the long and short run. This simply implied that the purpose and objective of this loan to stimulate output has not been successful. Based on the above, this study recommended the need for greater deliberation and conscious effort by the government to ensure that loans reach those in real need. There is also the need for the moderation of collaterals and interest rates attached to such loans to make more attractive to stakeholders in the SMEs sectors.

Nigerian deposit money banks remain dominant in the banking system in terms of their shares of total assets and deposit liabilities. Their total loans and advances, a major component of total credits to the private sector, are still on the increase in spite of the major constraints posted by the government regulations, institutional constraints and other macro-economic factors. We conclude that both government and deposit money banks should be mindful of the facts that the environments in which they operate are important factors in the bank performance. Where the environment is conducive and supportive, the performance of banks is enhanced and good lending behavior is guaranteed. But where the environment is unstable and harsh, the bank’s performances suffer. Deposit money banks should note that they need to do a lot in order to ensure good lending behavior even where a good measure of macroeconomic stability is achieved. This is because of the positive and significant relationship found between thebank-lending rate and bank performance in both short and long run.

5.3 Recommendations

i. Having seen that there exists a long run and short run relationship between manufacturing capacity and explanatory variables (Loan to SMEs and Interest (lending rate) through the use of co-integration test and error correction model, government should adopt policies that will help Nigerian deposit money banks to improve on their performance in terms of loans and advances to SMEs through Bank of Industry (BOI), Bank of Agriculture (BOA) anduse of fiscal and monetary policy mix for the sustenance of the scheme to achieve a desired result.
ii. There is the need to strengthen bank lending rate policy through effective and efficient regulation and supervisory framework.
iii. Banks should try as much as possible to strike a balance in their loan pricing decisions. This will help them to be able to achieve the SMEEIS objective.

5.4 Areas for Further Research

This study examined the relationship between banks loan to SMEs and manufacturing output in Nigeria and observed that the impact of banks loan to SMEs has an insignificant effect on manufacturing output. This study can be further enriched by directing examining the contribution of the Small and Medium Industries Equity Investment Scheme (SMEEIS) initiated in 2001 on the performance of the SMEs sector. Extending the study in this area would definitely enrich the policy recommendations of the government in enhancing the performance of the SME sector.

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APPENDICES

APPENDIX 1: DESCRIPTIVE STATISTICS

	LOGMC	LOGLLM	IR
Mean	12.64965	10.50896	77.59246
Median	12.74856	10.45606	101.0392
Maximum	13.90429	11.85057	156.7000
Minimum	11.12906	8.742018	3.316600
Std. Dev.	0.821700	0.862804	61.40422
Skewness	-0.266880	-0.170877	-0.027349
Kurtosis	2.018474	1.932389	1.191593
Jarque-Bera	1.456342	1.466021	3.818882

Probability	**0.482791**	**0.480460**	**0.148163**
Sum	**354.1902**	**294.2508**	**2172.589**
Sum Sq. Dev.	**18.23017**	**20.09962**	**101802.9**
Observations	**28**	**28**	**28**

SOURCE: EVIEWS 8

APPENDIX 2: UNIT ROOT TEST (ADF AND PP)

LOGMC: ADF-LEVELS (INTERCEPT)

Null Hypothesis: LOGMC has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.329171	0.6010
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LOGMC)

Method: Least Squares

Date: 07/06/15 Time: 20:37

Sample (adjusted): 1987 2013

Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

LOGMC(-1)	-0.029772	0.022399	-1.329171	0.1958
C	0.478012	0.282846	1.690007	0.1035

R-squared	0.066003	Mean dependent var	0.102787
Adjusted R-squared	0.028644	S.D. dependent var	0.092591
S.E. of regression	0.091255	Akaike info criterion	-1.879134
Sum squared resid	0.208186	Schwarz criterion	-1.783146
Log likelihood	27.36830	Hannan-Quinn criter.	-1.850591
F-statistic	1.766695	Durbin-Watson stat	2.216855
Prob(F-statistic)	0.195795		

LOGMC: ADF UNIT ROOT TEST-LEVELS (TREND AND INTERCEPT)

Null Hypothesis: LOGMC has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.268354	0.4357
Test critical values:	1% level	-4.339330	

5% level	-3.587527
10% level	-3.229230

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LOGMC)

Method: Least Squares

Date: 07/06/15 Time: 20:45

Sample (adjusted): 1987 2013

Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGMC(-1)	-0.305373	0.134623	-2.268354	0.0326
C	3.558221	1.509675	2.356945	0.0269
@TREND("1986")	0.028088	0.013551	2.072706	0.0491

R-squared	0.207809	Mean dependent var	0.102787
Adjusted R-squared	0.141793	S.D. dependent var	0.092591
S.E. of regression	0.085775	Akaike info criterion	-1.969730
Sum squared resid	0.176578	Schwarz criterion	-1.825748
Log likelihood	29.59135	Hannan-Quinn criter.	-1.926917
F-statistic	3.147867	Durbin-Watson stat	1.986119
Prob(F-statistic)	0.061088		

LOGMC; ADF UNIT ROOT TEST- FIRST DIFFERENCE (INTERCEPT)

Null Hypothesis: D(LOGMC) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.313904	0.0002
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LOGMC,2)

Method: Least Squares

Date: 07/06/15 Time: 20:51

Sample (adjusted): 1988 2013

Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(LOGMC(-1))	-1.080352	0.203307	-5.313904	0.0000
C	0.109126	0.028347	3.849633	0.0008

R-squared	0.540561	Mean dependent var	-0.004034
Adjusted R-squared	0.521417	S.D. dependent var	0.137908
S.E. of regression	0.095405	Akaike info criterion	-1.787578
Sum squared resid	0.218449	Schwarz criterion	-1.690801
Log likelihood	25.23851	Hannan-Quinn criter.	-1.759710
F-statistic	28.23758	Durbin-Watson stat	2.036898
Prob(F-statistic)	0.000019		

LOGMC: ADF UNIT ROOT TEST- FIRST DIFFERENCE (TREND AND INTERCEPT).

Null Hypothesis: D(LOGMC) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.367646	0.0010
Test critical values:	1% level	-4.356068	

5% level	-3.595026
10% level	-3.233456

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LOGMC,2)

Method: Least Squares

Date: 07/06/15 Time: 20:53

Sample (adjusted): 1988 2013

Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGMC(-1))	-1.111781	0.207126	-5.367646	0.0000
C	0.145470	0.049521	2.937545	0.0074
@TREND("1986")	-0.002279	0.002542	-0.896861	0.3791

R-squared	0.556085	Mean dependent var	-0.004034
Adjusted R-squared	0.517484	S.D. dependent var	0.137908
S.E. of regression	0.095796	Akaike info criterion	-1.745029
Sum squared resid	0.211067	Schwarz criterion	-1.599864
Log likelihood	25.68538	Hannan-Quinn criter.	-1.703227
F-statistic	14.40588	Durbin-Watson stat	2.058216
Prob(F-statistic)	0.000088		

LOGMC: PP UNIT ROOT TEST- LEVELS (INTERCEPT).

Null Hypothesis: LOGMC has a unit root

Exogenous: Constant

Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.914100	0.3212
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

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

Residual variance (no correction)	0.007711
HAC corrected variance (Bartlett kernel)	0.002743

Phillips-Perron Test Equation

Dependent Variable: D(LOGMC)

Method: Least Squares

Date: 07/06/15 Time: 21:00

Sample (adjusted): 1987 2013

Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGMC(-1)	-0.029772	0.022399	-1.329171	0.1958
C	0.478012	0.282846	1.690007	0.1035

R-squared	0.066003	Mean dependent var	0.102787
Adjusted R-squared	0.028644	S.D. dependent var	0.092591
S.E. of regression	0.091255	Akaike info criterion	-1.879134
Sum squared resid	0.208186	Schwarz criterion	-1.783146
Log likelihood	27.36830	Hannan-Quinn criter.	-1.850591
F-statistic	1.766695	Durbin-Watson stat	2.216855
Prob(F-statistic)	0.195795		

LOGMC: PP UNIT ROOT TEST- LEVELS (TREND AND INTERCEPT).

Null Hypothesis: LOGMC has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.170614	0.4859
Test critical values:	1% level	-4.339330	

5% level	-3.587527
10% level	-3.229230

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

Residual variance (no correction)	0.006540
HAC corrected variance (Bartlett kernel)	0.005434

Phillips-Perron Test Equation

Dependent Variable: D(LOGMC)

Method: Least Squares

Date: 07/06/15 Time: 21:01

Sample (adjusted): 1987 2013

Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGMC(-1)	-0.305373	0.134623	-2.268354	0.0326
C	3.558221	1.509675	2.356945	0.0269
@TREND("1986")	0.028088	0.013551	2.072706	0.0491

R-squared	0.207809	Mean dependent var	0.102787
Adjusted R-squared	0.141793	S.D. dependent var	0.092591
S.E. of regression	0.085775	Akaike info criterion	-1.969730

Sum squared resid	0.176578	Schwarz criterion	-1.825748
Log likelihood	29.59135	Hannan-Quinn criter.	-1.926917
F-statistic	3.147867	Durbin-Watson stat	1.986119
Prob(F-statistic)	0.061088		

LOGMC: PP UNIT ROOT TEST- FIRST DIFFERENCE (INTERCEPT).

Null Hypothesis: D(LOGMC) has a unit root

Exogenous: Constant

Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.444948	0.0001
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

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

Residual variance (no correction)	0.008402
HAC corrected variance (Bartlett kernel)	0.005841

Phillips-Perron Test Equation

Dependent Variable: D(LOGMC,2)

Method: Least Squares

Date: 07/06/15 Time: 21:02

Sample (adjusted): 1988 2013

Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGMC(-1))	-1.080352	0.203307	-5.313904	0.0000
C	0.109126	0.028347	3.849633	0.0008

R-squared	0.540561	Mean dependent var	-0.004034
Adjusted R-squared	0.521417	S.D. dependent var	0.137908
S.E. of regression	0.095405	Akaike info criterion	-1.787578
Sum squared resid	0.218449	Schwarz criterion	-1.690801
Log likelihood	25.23851	Hannan-Quinn criter.	-1.759710
F-statistic	28.23758	Durbin-Watson stat	2.036898
Prob(F-statistic)	0.000019		

LOGMC: PP UNIT ROOT TEST- FIRST DIFFERENCE (TREND AND INTERCEPT).

Null Hypothesis: D(LOGMC) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.855950	0.0003
Test critical values:	1% level	-4.356068	
	5% level	-3.595026	
	10% level	-3.233456	

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

Residual variance (no correction)	0.008118
HAC corrected variance (Bartlett kernel)	0.003866

Phillips-Perron Test Equation

Dependent Variable: D(LOGMC,2)

Method: Least Squares

Date: 07/06/15 Time: 21:03

Sample (adjusted): 1988 2013

Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGMC(-1))	-1.111781	0.207126	-5.367646	0.0000
C	0.145470	0.049521	2.937545	0.0074

@TREND("1986")	-0.002279	0.002542	-0.896861	0.3791

R-squared	0.556085	Mean dependent var	-0.004034
Adjusted R-squared	0.517484	S.D. dependent var	0.137908
S.E. of regression	0.095796	Akaike info criterion	-1.745029
Sum squared resid	0.211067	Schwarz criterion	-1.599864
Log likelihood	25.68538	Hannan-Quinn criter.	-1.703227
F-statistic	14.40588	Durbin-Watson stat	2.058216
Prob(F-statistic)	0.000088		

LOGLLM: ADF UNIT ROOT TEST- LEVELS (INTERCEPT).

Null Hypothesis: LOGLLM has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.455327	0.5403
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LOGLLM)

Method: Least Squares

Date: 07/06/15 Time: 21:09

Sample (adjusted): 1987 2013

Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGLLM(-1)	-0.063047	0.043322	-1.455327	0.1580
C	0.774559	0.454509	1.704165	0.1008

R-squared	0.078102	Mean dependent var	0.115131
Adjusted R-squared	0.041226	S.D. dependent var	0.188919
S.E. of regression	0.184984	Akaike info criterion	-0.465906
Sum squared resid	0.855478	Schwarz criterion	-0.369919
Log likelihood	8.289737	Hannan-Quinn criter.	-0.437364
F-statistic	2.117976	Durbin-Watson stat	2.075063
Prob(F-statistic)	0.158022		

LOGLLM: ADF UNIT ROOT TEST- LEVELS (TREND AND INTERCEPT).

Null Hypothesis: LOGLLM has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 2 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.234240	0.0135
Test critical values:	1% level	-4.374307	
	5% level	-3.603202	
	10% level	-3.238054	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LOGLLM)

Method: Least Squares

Date: 07/06/15 Time: 21:10

Sample (adjusted): 1989 2013

Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGLLM(-1)	-1.201691	0.283803	-4.234240	0.0004
D(LOGLLM(-1))	0.463837	0.229327	2.022600	0.0567

D(LOGLLM(-2))	0.370089	0.173280	2.135780	0.0452
C	10.86744	2.538972	4.280254	0.0004
@TREND("1986")	0.123146	0.029274	4.206640	0.0004

R-squared	0.498976	Mean dependent var	0.096403
Adjusted R-squared	0.398771	S.D. dependent var	0.169907
S.E. of regression	0.131744	Akaike info criterion	-1.039050
Sum squared resid	0.347132	Schwarz criterion	-0.795274
Log likelihood	17.98812	Hannan-Quinn criter.	-0.971437
F-statistic	4.979561	Durbin-Watson stat	2.147183
Prob(F-statistic)	0.005970		

LOGLLM: PP UNIT ROOT TEST- LEVELS (INTERCEPT).

Null Hypothesis: LOGLLM has a unit root

Exogenous: Constant

Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.481102	0.5277
Test critical values:	1% level	-3.699871	

5% level	-2.976263
10% level	-2.627420

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

Residual variance (no correction)	0.031684
HAC corrected variance (Bartlett kernel)	0.027660

Phillips-Perron Test Equation

Dependent Variable: D(LOGLLM)

Method: Least Squares

Date: 07/06/15 Time: 21:21

Sample (adjusted): 1987 2013

Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGLLM(-1)	-0.063047	0.043322	-1.455327	0.1580
C	0.774559	0.454509	1.704165	0.1008

R-squared	0.078102	Mean dependent var	0.115131
Adjusted R-squared	0.041226	S.D. dependent var	0.188919
S.E. of regression	0.184984	Akaike info criterion	-0.465906
Sum squared resid	0.855478	Schwarz criterion	-0.369919

Log likelihood	8.289737	Hannan-Quinn criter.	-0.437364
F-statistic	2.117976	Durbin-Watson stat	2.075063
Prob(F-statistic)	0.158022		

LOGLLM: PP UNIT ROOT TEST- LEVELS (TREND AND INTERCEPT).

Null Hypothesis: LOGLLM has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.654616	0.0049
Test critical values:	1% level	-4.339330	
	5% level	-3.587527	
	10% level	-3.229230	

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

Residual variance (no correction)	0.017641
HAC corrected variance (Bartlett kernel)	0.017641

Phillips-Perron Test Equation

Dependent Variable: D(LOGLLM)

Method: Least Squares

Date: 07/06/15   Time: 21:22

Sample (adjusted): 1987 2013

Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGLLM(-1)	-0.807067	0.173391	-4.654616	0.0001
C	7.437039	1.563103	4.757869	0.0001
@TREND("1986")	0.079959	0.018294	4.370858	0.0002

R-squared	0.486699	Mean dependent var	0.115131
Adjusted R-squared	0.443924	S.D. dependent var	0.188919
S.E. of regression	0.140878	Akaike info criterion	-0.977404
Sum squared resid	0.476320	Schwarz criterion	-0.833422
Log likelihood	16.19495	Hannan-Quinn criter.	-0.934590
F-statistic	11.37808	Durbin-Watson stat	1.644481
Prob(F-statistic)	0.000335		

IR: ADF UNIT ROOT TEST- LEVELS (INTERCEPT).

Null Hypothesis: IR has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.538263	0.8685
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(IR)

Method: Least Squares

Date: 07/06/15 Time: 21:23

Sample (adjusted): 1987 2013

Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR(-1)	-0.025763	0.047863	-0.538263	0.5952
C	7.569770	4.569829	1.656467	0.1101

R-squared	0.011456	Mean dependent var	5.645311
Adjusted R-squared	-0.028085	S.D. dependent var	14.58554

S.E. of regression	14.78895	Akaike info criterion	8.296824
Sum squared resid	5467.823	Schwarz criterion	8.392812
Log likelihood	-110.0071	Hannan-Quinn criter.	8.325366
F-statistic	0.289727	Durbin-Watson stat	1.704773
Prob(F-statistic)	0.595156		

IR: ADF UNIT ROOT TEST- LEVELS (TREND AND INTERCEPT).

Null Hypothesis: IR has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.895118	0.6293
Test critical values:	1% level	-4.339330	
	5% level	-3.587527	
	10% level	-3.229230	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(IR)

Method: Least Squares

Date: 07/06/15   Time: 21:24

Sample (adjusted): 1987 2013

Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR(-1)	-0.252698	0.133342	-1.895118	0.0702
C	-1.306334	6.566886	-0.198927	0.8440
@TREND("1986")	1.844838	1.017986	1.812243	0.0825

R-squared	0.130448	Mean dependent var	5.645311
Adjusted R-squared	0.057985	S.D. dependent var	14.58554
S.E. of regression	14.15635	Akaike info criterion	8.242643
Sum squared resid	4809.656	Schwarz criterion	8.386625
Log likelihood	-108.2757	Hannan-Quinn criter.	8.285457
F-statistic	1.800211	Durbin-Watson stat	1.560387
Prob(F-statistic)	0.186873		

IR: ADF UNIT ROOT TEST- FIRST DIFFERENCE (INTERCEPT).

Null Hypothesis: D(IR) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.289593	0.0025
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(IR,2)

Method: Least Squares

Date: 07/06/15 Time: 21:24

Sample (adjusted): 1988 2013

Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IR(-1))	-0.868995	0.202582	-4.289593	0.0003

C	5.059872	3.176294	1.593011	0.1242

R-squared	0.433970	Mean dependent var	-0.040577
Adjusted R-squared	0.410386	S.D. dependent var	19.55865
S.E. of regression	15.01837	Akaike info criterion	8.330229
Sum squared resid	5413.236	Schwarz criterion	8.427006
Log likelihood	-106.2930	Hannan-Quinn criter.	8.358097
F-statistic	18.40060	Durbin-Watson stat	1.972399
Prob(F-statistic)	0.000253		

IR: ADF UNIT ROOT TEST- FIRST DIFFERENCE (TREND AND INTERCEPT).

Null Hypothesis: D(IR) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.192658	0.0143
Test critical values:	1% level	-4.356068	
	5% level	-3.595026	

c

10% level	-3.233456

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(IR,2)

Method: Least Squares

Date: 07/06/15 Time: 21:25

Sample (adjusted): 1988 2013

Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IR(-1))	-0.868538	0.207157	-4.192658	0.0003
C	5.331423	6.616090	0.805827	0.4286
@TREND("1986")	-0.018913	0.401581	-0.047096	0.9628

R-squared	0.434025	Mean dependent var	-0.040577
Adjusted R-squared	0.384810	S.D. dependent var	19.55865
S.E. of regression	15.34064	Akaike info criterion	8.407056
Sum squared resid	5412.714	Schwarz criterion	8.552221
Log likelihood	-106.2917	Hannan-Quinn criter.	8.448858
F-statistic	8.818915	Durbin-Watson stat	1.973407
Prob(F-statistic)	0.001436		

IR: PP UNIT ROOT TEST- LEVELS (INTERCEPT).

Null Hypothesis: IR has a unit root

Exogenous: Constant

Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.538263	0.8685
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

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

Residual variance (no correction)	202.5119
HAC corrected variance (Bartlett kernel)	202.5119

Phillips-Perron Test Equation

Dependent Variable: D(IR)

Method: Least Squares

Date: 07/06/15 Time: 21:27

Sample (adjusted): 1987 2013

Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR(-1)	-0.025763	0.047863	-0.538263	0.5952
C	7.569770	4.569829	1.656467	0.1101

R-squared	0.011456	Mean dependent var	5.645311
Adjusted R-squared	-0.028085	S.D. dependent var	14.58554
S.E. of regression	14.78895	Akaike info criterion	8.296824
Sum squared resid	5467.823	Schwarz criterion	8.392812
Log likelihood	-110.0071	Hannan-Quinn criter.	8.325366
F-statistic	0.289727	Durbin-Watson stat	1.704773
Prob(F-statistic)	0.595156		

IR: PP UNIT ROOT TEST- LEVELS (TREND AND INTERCEPT).

Null Hypothesis: IR has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.047329	0.5504
Test critical values:	1% level	-4.339330	
	5% level	-3.587527	

10% level	-3.229230

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

Residual variance (no correction)	178.1354
HAC corrected variance (Bartlett kernel)	215.6692

Phillips-Perron Test Equation

Dependent Variable: D(IR)

Method: Least Squares

Date: 07/06/15 Time: 21:28

Sample (adjusted): 1987 2013

Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR(-1)	-0.252698	0.133342	-1.895118	0.0702
C	-1.306334	6.566886	-0.198927	0.8440
@TREND("1986")	1.844838	1.017986	1.812243	0.0825

R-squared	0.130448	Mean dependent var	5.645311
Adjusted R-squared	0.057985	S.D. dependent var	14.58554
S.E. of regression	14.15635	Akaike info criterion	8.242643
Sum squared resid	4809.656	Schwarz criterion	8.386625

Log likelihood	-108.2757	Hannan-Quinn criter.	8.285457
F-statistic	1.800211	Durbin-Watson stat	1.560387
Prob(F-statistic)	0.186873		

IR: PP UNIT ROOT TEST- FIRST DIFFERENCE (INTERCEPT).

Null Hypothesis: D(IR) has a unit root

Exogenous: Constant

Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.267138	0.0027
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

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

Residual variance (no correction)	208.2014
HAC corrected variance (Bartlett kernel)	195.3078

Phillips-Perron Test Equation

Dependent Variable: D(IR,2)

Method: Least Squares

Date: 07/06/15   Time: 21:28

Sample (adjusted): 1988 2013

Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IR(-1))	-0.868995	0.202582	-4.289593	0.0003
C	5.059872	3.176294	1.593011	0.1242

R-squared	0.433970	Mean dependent var	-0.040577
Adjusted R-squared	0.410386	S.D. dependent var	19.55865
S.E. of regression	15.01837	Akaike info criterion	8.330229
Sum squared resid	5413.236	Schwarz criterion	8.427006
Log likelihood	-106.2930	Hannan-Quinn criter.	8.358097
F-statistic	18.40060	Durbin-Watson stat	1.972399
Prob(F-statistic)	0.000253		

IR: PP UNIT ROOT TEST- FIRST DIFFERENCE (TREND AND INTERCEPT).

Null Hypothesis: D(IR) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.166651	0.0151
Test critical values:	1% level	-4.356068	
	5% level	-3.595026	
	10% level	-3.233456	

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

Residual variance (no correction)	208.1813
HAC corrected variance (Bartlett kernel)	195.1652

Phillips-Perron Test Equation

Dependent Variable: D(IR,2)

Method: Least Squares

Date: 07/06/15 Time: 21:29

Sample (adjusted): 1988 2013

Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IR(-1))	-0.868538	0.207157	-4.192658	0.0003
C	5.331423	6.616090	0.805827	0.4286

@TREND("1986")	-0.018913	0.401581	-0.047096	0.9628

R-squared	0.434025	Mean dependent var	-0.040577
Adjusted R-squared	0.384810	S.D. dependent var	19.55865
S.E. of regression	15.34064	Akaike info criterion	8.407056
Sum squared resid	5412.714	Schwarz criterion	8.552221
Log likelihood	-106.2917	Hannan-Quinn criter.	8.448858
F-statistic	8.818915	Durbin-Watson stat	1.973407
Prob(F-statistic)	0.001436		

APPENDIX 3: ESTIMATION OF ARDL MODEL

ARDL Model	**AIC**	**SC**	**Log likelihood**	**F Wald test**	**P of Wald test**
ARDL(1,1,1)	**-1.516650**	**-1.177931**	**26.71644**	**0.525930**	**0.669800**
ARDL(1,1,2)	**-1.389810**	**-0.999769**	**25.37262**	**0.506092**	**0.683300**
ARDL(1,2,1)	**-1.389686**	**-0.999646**	**25.37108**	**0.552050**	**0.653600**
ARDL(1,2,2)	**-1.318011**	**-0.879215**	**25.47513**	**0.515982**	**0.677200**
ARDL(2,1,1)	**-1.419240**	**-1.029200**	**25.74050**	**0.502298**	**0.685700**
ARDL(2,1,2)	**-1.349414**	**-0.910619**	**25.86767**	**0.473520**	**0.705000**

ARDL(2,2,1)	**-1.339266**	**-0.900470**	**25.74082**	**0.454897**	**0.717500**
ARDL(2,2,2)	**-1.269473**	**-0.781923**	**25.86841**	**0.441799**	**0.726500**

SOURCE: EVIEWS 8

APPENDIX 4: RESIDUAL DIAGNOSTICS TEST

BREUSCH-GODFREY SERIAL CORRELATION LM TEST:

F-statistic	0.382659	Prob. F(2,17)	0.6878

Obs*R-squared	1.120062	Prob. Chi-Square(2)		0.5712

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 06/10/15 Time: 21:53

Sample: 1988 2013

Included observations: 26

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.087503	3.332622	-0.626384	0.5394
@TREND	-0.019770	0.036070	-0.548088	0.5908
D(LOGLLM(-1))	-0.011678	0.131569	-0.088762	0.9303
D(IR(-1))	-0.000672	0.001640	-0.409986	0.6869
LOGMC(-1)	0.169924	0.268669	0.632467	0.5355
LOGLLM(-1)	0.020379	0.175917	0.115843	0.9091
IR(-1)	0.000192	0.001149	0.167471	0.8690
RESID(-1)	-0.283791	0.383168	-0.740645	0.4690
RESID(-2)	-0.231891	0.308056	-0.752757	0.4619

R-squared	0.043079	Mean dependent var	-6.29E-16
Adjusted R-squared	-0.407236	S.D. dependent var	0.077344

S.E. of regression	0.091751	Akaike info criterion	-1.672063
Sum squared resid	0.143109	Schwarz criterion	-1.236568
Log likelihood	30.73682	Hannan-Quinn criter.	-1.546656
F-statistic	0.095665	Durbin-Watson stat	2.029293
Prob(F-statistic)	0.998923		

HETEROSKEDASTICITY TEST: BREUSCH-PAGAN-GODFREY

F-statistic	0.467284	Prob. F(6,19)	0.8239
Obs*R-squared	3.343297	Prob. Chi-Square(6)	0.7647
Scaled explained SS	2.396075	Prob. Chi-Square(6)	0.8799

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 06/10/15 Time: 21:55

Sample: 1988 2013

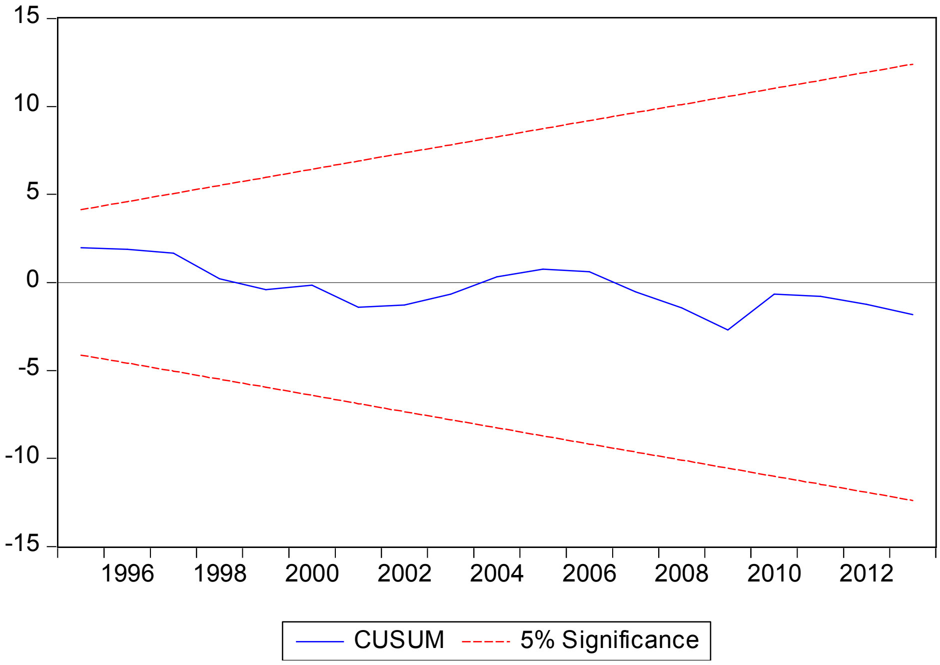
Included observations: 26

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.393623	0.249061	1.580429	0.1305
@TREND	0.004616	0.003040	1.518358	0.1454
D(LOGLLM(-1))	0.003975	0.014299	0.277989	0.7840
D(IR(-1))	5.44E-05	0.000162	0.335070	0.7412
LOGMC(-1)	-0.025719	0.019542	-1.316110	0.2038
LOGLLM(-1)	-0.011326	0.019554	-0.579184	0.5693
IR(-1)	-0.000139	0.000124	-1.119505	0.2769

R-squared	0.128588	Mean dependent var	0.005752
Adjusted R-squared	-0.146594	S.D. dependent var	0.009610
S.E. of regression	0.010290	Akaike info criterion	-6.090391
Sum squared resid	0.002012	Schwarz criterion	-5.751673
Log likelihood	86.17508	Hannan-Quinn criter.	-5.992852
F-statistic	0.467284	Durbin-Watson stat	2.062129
Prob(F-statistic)	0.823930		

SOURCE: EVIEWS 8

STABILITY TEST



The model is stable using CUSUM test. The blue line is within the two red line meaning the model is stable.

APPENDIX 5: BOUNDS TEST

Wald Test:

Equation: Untitled

Test Statistic	Value	Df	Probability
F-statistic	2.493614	(3, 19)	0.0910
Chi-square	7.480841	3	0.0581

Null Hypothesis: C(5)=C(6)=C(7)=0

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(5)	-0.382557	0.168480
C(6)	-0.171613	0.168587
C(7)	-0.001471	0.001071

Restrictions are linear in coefficients.

PESARAN CRITICAL VALUES AT 5% SIGNIFICANCE LEVEL

LOWER VALUE	UPPER VALUE
4.87	5.85

APPENDIX 6: ESTIMATION OF UNRESTRICTED VAR MODEL

Vector Autoregression Estimates

Date: 06/22/15 Time: 17:54

Sample (adjusted): 1989 2013

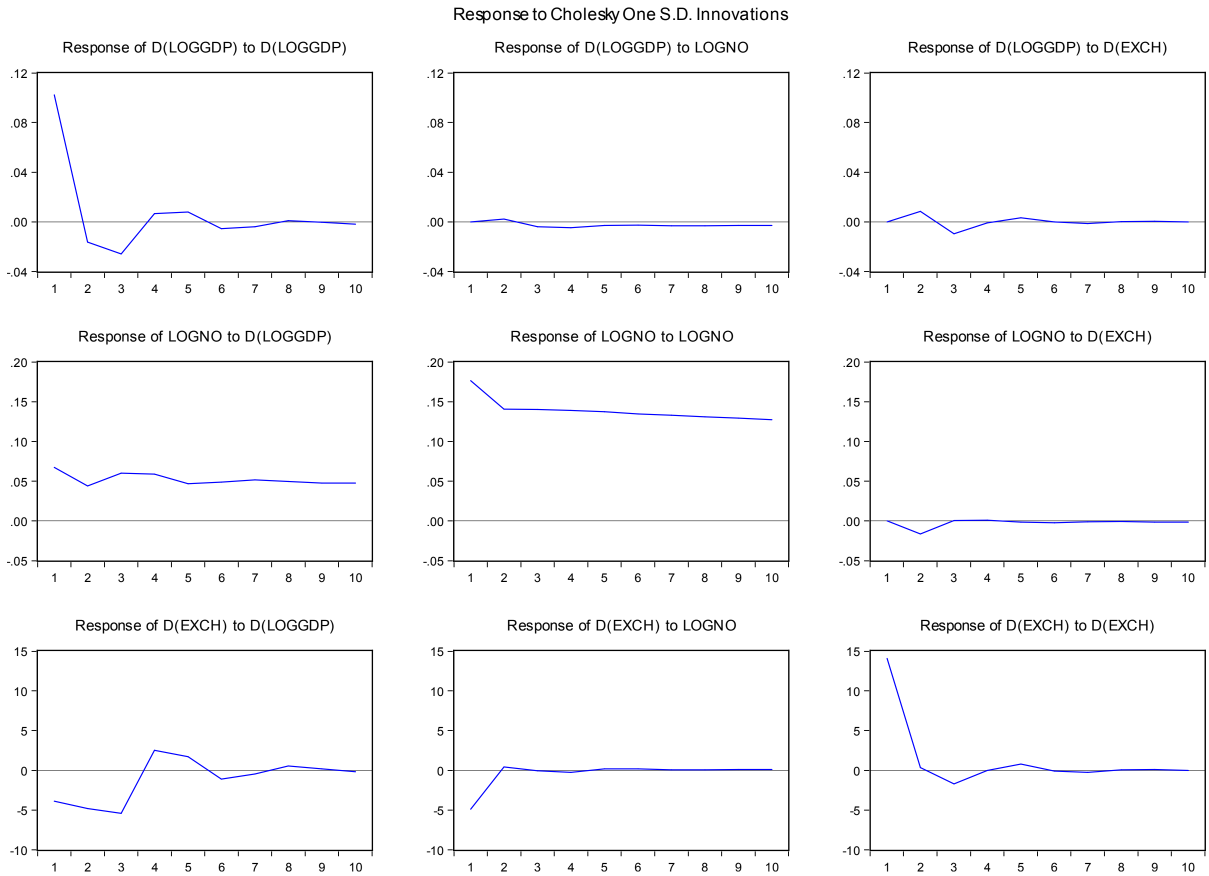
Included observations: 25 after adjustments

Standard errors in ( )& t-statistics in [ ]

	D(LOGMC)	LOGLLM	D(IR)
D(LOGMC(-1))	-0.155886	-0.116092	-47.98338
	(0.23678)	(0.43663)	(35.6805)
	[-0.65835]	[-0.26588]	[-1.34481]
D(LOGMC(-2))	-0.243687	0.081236	-60.95637
	(0.23642)	(0.43595)	(35.6250)
	[-1.03076]	[0.18634]	[-1.71105]
LOGLLM(-1)	0.029395	0.764741	2.959111
	(0.14096)	(0.25993)	(21.2407)
	[0.20854]	[2.94215]	[0.13931]
LOGLLM(-2)	-0.060548	0.217596	-4.697497
	(0.14119)	(0.26035)	(21.2750)
	[-0.42885]	[0.83580]	[-0.22080]
D(IR(-1))	0.000595	-0.001162	0.025505
	(0.00156)	(0.00288)	(0.23574)
	[0.38015]	[-0.40284]	[0.10819]

D(IR(-2))	-0.000570	0.001017	-0.090222
	(0.00141)	(0.00260)	(0.21285)
	[-0.40352]	[0.39064]	[-0.42388]
C	0.464990	0.307612	35.79487
	(0.31009)	(0.57180)	(46.7267)
	[1.49954]	[0.53797]	[0.76605]
R-squared	0.137421	0.953553	0.219109
Adj. R-squared	-0.150106	0.938070	-0.041188
Sum sq. resids	0.188625	0.641388	4283.111
S.E. equation	0.102368	0.188766	15.42565
F-statistic	0.477941	61.58956	0.841765
Log likelihood	25.61240	10.31399	-99.76795
Akaike AIC	-1.488992	-0.265119	8.541436
Schwarz SC	-1.147707	0.076166	8.882721
Mean dependent	0.099354	10.66942	6.015480
S.D. dependent	0.095454	0.758535	15.11746
Determinant resid covariance (dof adj.)		0.064794	
Determinant resid covariance		0.024184	
Log likelihood		-59.89480	
Akaike information criterion		6.471584	
Schwarz criterion		7.495439	

APPENDIX 7: IMPULSE RESPONSE FUNCTION GRAPH


Response to Cholesky One S.D. Innovations
Response of D(LOGGDP) to D(LOGGDP)
Response of D(LOGGDP) to LOGNO
Response of D(LOGGDP) to D(EXCH)
Response of LOGNO to D(LOGGDP)
Response of LOGNO to LOGNO
Response of LOGNO to D(EXCH)
Response of D(EXCH) to D(LOGGDP)
Response of D(EXCH) to LOGNO
Response of D(EXCH) to D(EXCH)

IMPULSE RESPONSE FUNCTION TABLE

Response of

D(LOGMC):

Period	D(LOGMC)	LOGLLM	D(IR)
1	0.102368	0.000000	0.000000
2	-0.016312	0.002277	0.008383
3	-0.025806	-0.003879	-0.009609
4	0.006623	-0.004610	-0.000764
5	0.007911	-0.002841	0.003410
6	-0.005440	-0.002554	4.18E-05
7	-0.004098	-0.003261	-0.001316
8	0.000883	-0.003206	0.000202
9	-0.000215	-0.002879	0.000527
10	-0.001989	-0.002876	-9.83E-05

Response of LOGLLM:

Period	D(LOGMC)	LOGLLM	D(IR)
1	0.067181	0.176407	0.000000
2	0.044043	0.140590	-0.016381
3	0.060118	0.140197	0.000424
4	0.058621	0.138928	0.000913
5	0.046635	0.137173	-0.001589
6	0.048609	0.134602	-0.002425
7	0.051604	0.132835	-0.001020
8	0.049508	0.131203	-0.000927
9	0.047541	0.129319	-0.001431
10	0.047579	0.127442	-0.001385

Response of D(IR):

Period	D(LOGMC)	LOGLLM	D(IR)
1	-3.915840	-4.891352	14.09580
2	-4.813033	0.397254	0.359512
3	-5.412003	-0.070451	-1.713288
4	2.499793	-0.235836	-0.047869
5	1.698371	0.210513	0.776455
6	-1.102890	0.197256	-0.101886
7	-0.477746	0.035694	-0.282225

8	0.539964	0.056039	0.070953
9	0.168418	0.115070	0.099827
10	-0.179820	0.097761	-0.041320

Cholesky Ordering: D(LOGMC) LOGLLM D(IR)

APPENDIX 8: VARIANCE DECOMPOSITION TABLE

Variance Decomposition of D(LOGMC):				
Period	S.E.	D(LOGMC)	LOGLLM	D(IR)
1	0.102368	100.0000	0.000000	0.000000
2	0.104023	99.30267	0.047897	0.649435
3	0.107676	98.42307	0.174491	1.402435
4	0.107980	98.24470	0.355751	1.399546
5	0.108361	98.08924	0.422001	1.488762
6	0.108527	98.03971	0.476078	1.484211

7	0.108661	97.93982	0.564971	1.495206
8	0.108713	97.85446	0.651395	1.494147
9	0.108752	97.78361	0.720990	1.495405
10	0.108808	97.71594	0.790122	1.493941

Variance Decomposition of LOGLLM:

Period	S.E.	D(LOGMC)	LOGLLM	D(IR)
1	0.188766	12.66615	87.33385	0.000000
2	0.240013	11.20197	88.33223	0.465799
3	0.284387	12.44774	87.22026	0.332001
4	0.321892	13.03266	86.70740	0.259948
5	0.352998	12.58226	87.19956	0.218178
6	0.380912	12.43417	87.37440	0.191427
7	0.406698	12.51745	87.31399	0.168551
8	0.430197	12.51169	87.33721	0.151105
9	0.451725	12.45518	87.40677	0.138049
10	0.471765	12.43661	87.43596	0.127431

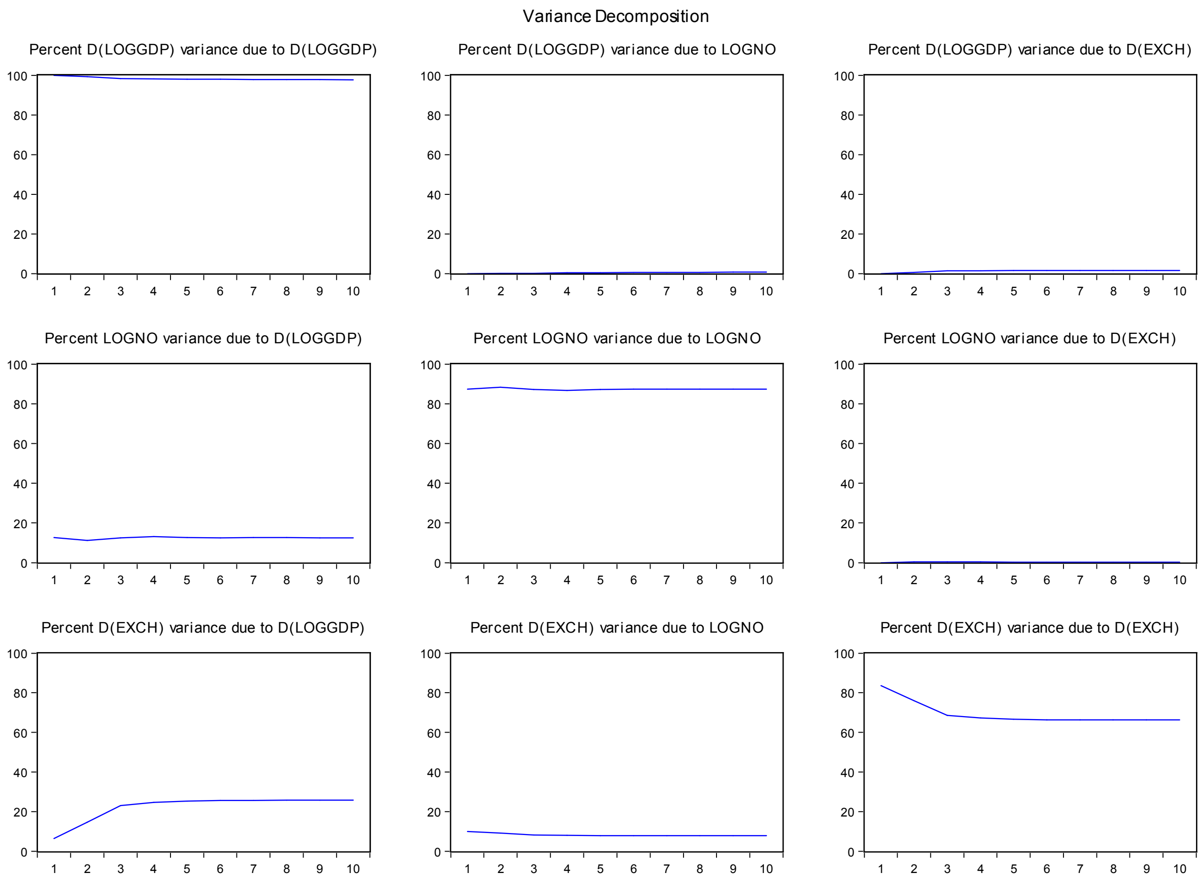
Variance Decomposition of D(IR):

Period	S.E.	D(LOGMC)	LOGLLM	D(IR)
1	15.42565	6.444111	10.05475	83.50114
2	16.16796	14.72787	9.213032	76.05910
3	17.13572	23.08625	8.203471	68.71028
4	17.31877	24.68422	8.049519	67.26626
5	17.42044	25.34744	7.970445	66.68211
6	17.45673	25.64132	7.950110	66.40857

7	17.46558	25.69016	7.942470	66.36737
8	17.47416	25.76042	7.935702	66.30387
9	17.47563	25.76536	7.938698	66.29594
10	17.47688	25.77227	7.940694	66.28704

Cholesky Ordering: D(LOGMC) LOGLLM D(IR)

VARIANCE DECOMPOSITION GRAPH



APPENDIX 9: RESIDUAL DIAGNOSTIC TEST FOR ESTIMATED VAR MODEL

VAR Residual Serial Correlation LM Tests

Null Hypothesis: no serial correlation at lag order h

Date: 06/22/15 Time: 18:02

Sample: 1986 2013

Included observations: 25

Lags	LM-Stat	Prob
1	3.662703	0.9322
2	2.240195	0.9871

3	12.61832	0.1807
4	13.84190	0.1281
5	10.78907	0.2904
6	3.984045	0.9125
7	11.27898	0.2571
8	9.481024	0.3941
9	10.94270	0.2797
10	6.376411	0.7017
11	10.61542	0.3030
12	6.660277	0.6724

Probs from chi-square with 9 df.

VAR Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)

Date: 06/22/15   Time: 18:04

Sample: 1986 2013

Included observations: 25

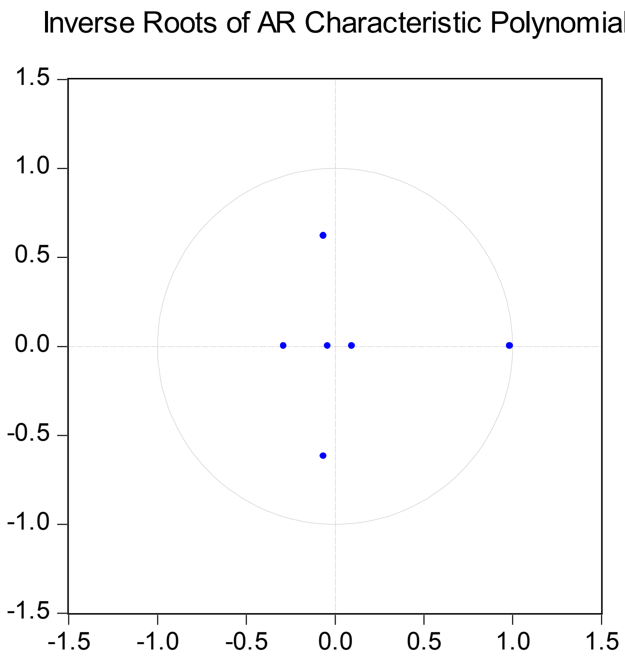
Joint test:

Chi-sq	df	Prob.
47.85288	72	0.9874

Individual components:

Dependent	R-squared	F(12,12)	Prob.	Chi-sq(12)	Prob.
res1*res1	0.263160	0.357147	0.9565	6.579001	0.8841
res2*res2	0.227518	0.294528	0.9781	5.687945	0.9310
res3*res3	0.416128	0.712705	0.7167	10.40321	0.5806
res2*res1	0.130966	0.150703	0.9987	3.274148	0.9933
res3*res1	0.366192	0.577766	0.8225	9.154808	0.6897
res3*res2	0.314813	0.459457	0.9038	7.870336	0.7952

STABILITY TEST



Roots of Characteristic Polynomial

Endogenous variables: D(LOGMC) LOGLLM D(IR)

Exogenous variables: C

Lag specification: 1 2

Date: 06/22/15 Time: 18:05

Root	Modulus
0.986092	0.986092
-0.061802 - 0.619361i	0.622436
-0.061802 + 0.619361i	0.622436

-0.287351	0.287351
0.097632	0.097632
-0.038409	0.038409

No root lies outside the unit circle.

VAR satisfies the stability condition.