Deposit Money Banks' Financial Intermediation and Performance of the Manufacturing Sector in Nigeria

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In Partial Fulfilment of the Requirements for the Award of Master of Science Degree (M. Sc.) in Finance

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2022

Certification

This is to certify that Fatola Opeyemi Akindele with matriculation number **LCU/PG/001947** carried out this research work titled, **"Deposit Money Banks' Financial Intermediation and the Performance of the Manufacturing Sector in Nigeria,"** in the Department of Management and Accounting, Faculty of Management and Social Sciences, Lead City University Ibadan, Oyo State, for the award of Master Degree (M. Sc.) in Finance and that this has not been previously submitted.

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Dedication

This research work is dedicated to God almighty and all those who desire and crave for knowledge but are constrained due to certain limitations- there is always hope abounding around the corner.

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Even though the above-mentioned institutions and persons have assisted in the process of this research work, I alone stand responsible for the errors, if any, found in the work.

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Abstract

Every country strives towards sustainable economic development, therefore, the place of financial intermediaries in reallocating financial resources to the deficit side as credit to achieve this, cannot be overemphasized. The Manufacturing Sector in Nigeria which comprises of some other sub-sectors has not been performing encouragingly well despite increasing credit made available to it by Deposit Money Banks, year in year out. More recent of this poor performance was a decline of -2.79% in the sector's contribution to the RGDP in 2020 as against the preceding year. Thus, this study investigated the varying dynamic relationship between Deposit Money Banks' financial intermediation and the performance of the Manufacturing sector in Nigeria, using exogenous variables such as Deposit Money Banks' Credits to the Manufacturing Sector (DMBCMS), Demand Deposits (DD), Loan-to-Deposit Ratio (LDR), Deposit Interest Rate (DIR) and Lending Interest Rate (LIR) on Manufacturing Sector's Output (MNOUT), the endogenous variable, using annual secondary data spanning from 1981 – 2020 sourced majorly from statistical bulletins from the Central Bank of Nigeria (CBN). Unit root and cointegraton tests indicated that the variables were of different orders, with long run relationship, which informed the use of ARDL.There were mixed results in both the short and long-runs. Notably was DMBCMS having a negative effect on the performance of the sector both in the short and long-run, which could be due to the negative effect of lending interest rate. ECT and the F-statistics were significant at 1% with a 91% and 1.72 R-squared and DW values respectively. Residual diagnostic tests all turned out efficient for forecasting. A major recommendation is that policies be made to lower lending rates to encourage investors as high lending rates is detrimental not just to the performance of the sector, but to economic growth as a whole and discourage importations in favour of domestic productions.

Keywords: *Deposit Money Banks, Financial Intermediation, Manufacturing Sector, CBN, ARDL*

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List of Acronyms

Abbreviation	Meaning
CBN	Central Bank of Nigeria
BOFID	Banks and Other Financial Institution Decree
BOFIA	Banks and Other Financial Institution Act
MPC	Monetary Policy Committee
NDIC	Nigeria Deposit Insurance Corporation
RGDP	Real Gross Domestic Product

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Chapter One

Introduction

1.1 Background to the Study

Countries do not just aspire to achieve economic growth but preferably sustainable economic development, which is a major difference between the developed, developing and under developed countries. To achieve economic growth and development, adequate financing with the use of financial resources must flow from one part of the economy to the other as economic agents and individuals require finance to serve different purposes.

For some people, cash refers only to money in the form of currency (cash in hand). For others, it means both cash in hand and cash at bank. Some include near cash assets in it. They take marketable securities too as part of cash. These are the securities which can easily be converted into cash. Cash itself does not produce goods or services. It is used as a medium to acquire other assets. It is the other assets which are used in manufacturing goods or providing services. The idle cash can be deposited in bank to earn interest. A business has to keep required cash for meeting various needs. The assets acquired by cash again help the business in producing cash. The goods manufactured or services produced are sold to acquire cash. A firm will have to maintain a critical level of cash. If at a time it does not have sufficient cash with it, it will have to borrow from the market for reaching the required level.

There are three different motives of holding money, the first of which is the transaction motive, which refers to the cash required by a firm to meet the day to day needs of its business operations[1]. In the usual flow of business, a firm requires cash to make the payments like salaries, wages, interests, dividends, goods purchased, etc. and likewise, receives cash

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from its sales, debtors and investments. Often the firm's cash inflows and outflows do not match, and hence, the cash is held up to meet its routine obligations.

Firms also hold money for precautionary motive which refers to the tendency of a firm to hold cash, to meet unforeseen circumstances arising in the course of its business. Since the future is uncertain, a firm may have to face contingencies such as an increase in the price of raw materials, labour strike, lockouts, change in the demand, etc. Thus, in order to meet with these uncertainties, the cash is held by the firms to have uninterrupted business operations.

Lastly, firms hold cash for speculative purposes to avail the benefit of bargain purchases that may arise in the future. For example, if the firm feels the prices of raw material are likely to fall in the future, it will hold cash and wait till the prices actually fall. Thus, a firm holds cash to exploit the possible opportunities that are out of the normal course of business. These opportunities could be in the form of the low-interest rate charged on the borrowed funds, expected fall in the raw material prices or favourable change in the government policies.

Thus, the cash is the most significant and liquid asset that the firm holds. It is significant as it is used to pay off the firm's obligations and helps in the expansion of business operations. These viewpoints reflect the degree of freedom of the persons using the cash. Whether a person or firm wants to use it immediately or can wait for a time to use it depends upon the needs of the concerned person or firm.

The side of the economy with excess financial resources is referred to as the surplus side, while those at the receiving end make up the deficit side. As much as these two sides of the economy may transact financial resources directly with each other, it is not always the case due to the risks involved such as repayment, high transactional costs associated with finding a lender or a borrower for the money and the presence of information asymmetry. Due to this,

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both lenders and borrowers of capital then tend to use the services of institutions called financial intermediaries. A financial intermediary does not only act as an agent for other institutional units, but places itself at risk by acquiring financial assets and incurring liabilities on its own account.

Financial intermediation can therefore be said to be the process by which intermediaries make available a connection between the surplus and deficit units in an economy. Surplus units are firms/individuals with excess financial resources above their immediate needs while those who need this fund for immediate investments are referred to as the deficit units. Financial intermediaries therefore develop the facilities which make this lending and borrowing possible[2].

Financial intermediaries then mobilize deposits from savers/depositors, and allocate credit facilities to borrowers/investors for economic productive investment[3]. The role of credit in any economy cannot be over-emphasized as credit facilities enable economic agents to meet their expenditure needs. For instance, business entities obtain credit to buy machinery and equipment, farmers take loans to buy seeds, fertilizers, erect various kinds of farm structures and government and publicly owned institutions obtain credits to meet various kinds of recurrent and capital expenditures[4].

When the distribution of income among the spending units is exactly the same, all units have balanced budgets on income and product account. When income and spending distributions differ, some spending units have surpluses while others have an equivalent amount of deficits. Surplus units (ultimate lenders) supply options equal to their surpluses and, in return, acquire an equal amount of net financial asset. Deficit units (ultimate borrowers) take up and exercise these options paying for them by increasing their net debt and equity. These budget imbalances normally lead to net issues of primary securities and net accommodation of

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financial assets. As said earlier, financial intermediaries serve as the middlemen that reallocate this inequality by collecting the excess funds from the surplus unit (ultimate lenders) with a reward in financial assets and transfer the surplus to the deficit unit (ultimate borrowers) as loans and advances.

There are two major forms of financial intermediation: Depository Financial Intermediaries (FIs) and Non-Depository Financial Institutions (FIs). Depository Financial Intermediations are institutions that accept money deposits and then use these to make loans. All the funds deposited are mingled in one big pool, which is then loaned out. The depository FIs are: commercial banks, thrifts, and credit unions. Non-Depository Financial Intermediaries on the other hand are financial institutions that do not have a full banking license and cannot accept deposits from the public. However, NDFIs also known as Non-Bank Financial Institutions (NBFIs) do facilitate alternative financial services, such as investment (both collective and individual), risk pooling, financial consulting, brokering, money transmission, and check cashing. The Non-Depository FIs are: investment banks, venture capitalists, financial companies, insurance companies, mutual funds, hedge funds, and credit-rating agencies.

Major functions of financial intermediation include liquidity creation which involves granting of short and long term loans. Financial intermediation activities channel the funds of depositors with surplus cash to entities that are looking for money borrowed. Maturity change is another function of financial intermediation as financial intermediaries like banks allows deposits of short-term and place those funds with debtor in long term. They provide maturity versatility service to individuals by creating financial promises with wide selection of maturities to balance the maturity of different instruments. They also see to the efficient allocation of funds. Financial intermediaries have the expertise to ensure that the flow of funds is allocated in the most efficient manner. Intermediaries, particularly the banks, are

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aware of the existence of asymmetric information. Asymmetric information means that the potential borrower has more information than the bank does about his/her business. The presence of asymmetric information leads to adverse selection and moral hazard problems. Financial Intermediaries ensures that available funds are allocated to borrowers that are expected to utilize the funds prudently, which in turn leads to an increase in economic activity.

Through financial intermediation activities, financial resources of small savers are pooled together as they pool many deposits, especially banks and use them to make large items. Insurance companies collect and invest many small premiums to pay fewer large claims. Mutual funds accept small investment amounts and pool them to buy large stock and bond portfolios. However, they provide necessary information to market participants to make decisions about how much to save or borrow and when. Banks play an important role within the capital markets by providing a vehicle for individuals, businesses and the government to allocate funds between savings and borrowing.

Because of their pool of activities, they enjoy economies of scale since the cost involved in the lending and borrowing of funds like analyzing credit position, operational expenses etc., decreases to a large extent since such activities are performed on a massive scale. They also provide a reliable payment system. Banks are a critical intermediary in what is called the payment system, which helps an economy exchange goods and services for money or other financial assets. Financial intermediaries like banks lower transactional costs by facilitating the payment system and making transactions much safer and easier with high level of risk management and transformation since they have expertise in screening, monitoring and evaluating risk. They offer low-risk securities to investors to attract funds. They also

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diversify the risk of the lenders (savers) by helping them investigate their savings across different sectors of business.

It is also worthy of note that financial intermediaries serve as instruments for economic stability as the Central Bank of Nigeria (CBN) uses the banking system to implement its monetary policy, mop up excess cash in the nation and tackle other economic factors. Financial intermediaries deal in a variety of assets and liabilities which are mostly traded in the capital market. If there were no financial intermediaries, there would be frequent changes in the demand and supply of financial assets and their relative yields, thereby bringing instability in the capital market.

When economic agents transact directly between each other, it is called financial disintermediation. A financial intermediary is therefore a middleman among different parties in order to facilitate financial transactions. Common types include commercial banks, investment banks, stockbrokers, pooled investment funds, stock exchanges, leasing companies, insurance and pension funds, mutual funds and micro-credit providers. Bank deposits therefore play a critical role in accelerating economic growth[5]. These activities and services are important to promote investments and the development of the economy thus banks idle deposits are given out as credits for productive investments.

The focus of this thesis therefore is to investigate the intermediating role of Deposit Money banks, also known as Commercial Banks, in Nigeria towards the development of the manufacturing sector of the country.

1.2 Statement of the Problem

The economic significance and importance of financial intermediation cannot be overemphasized as it is believed to be a major driver towards economic development of any

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nation. In order words, to achieve a healthy and financially balanced economy, financial intermediaries must effectively and efficiently discharge their mediating responsibility.

With the regular supervisory and regulatory roles performed by the Central Bank of Nigeria, commercial banks as a major financial intermediary in Nigeria has passed through many crises. Due to the unhealthy standing of many banks, the CBN, under the then governor in 2004, increased the minimum paid in capital of banks to ₦25 billion (US$173million) from N2billion (US$14million). This monetary policy was not effected until 2005, which led to the consolidation of the existing banks into less but financially buoyant banks. This policy made the 89 banks that existed as at 2004 decrease to 25 larger, better-capitalized banks in 2005[6].

In 2010, the CBN however came up with another policy, which is an important reversal of the consolidation policy in 2005. This new policy was targeted at classifying banks by function and allowing different amount of minimum paid in capital depending on the bank's function as opposed to the single current minimum capital of ₦25 billion. Banks did not fail; they were destroyed and brought to their knees by acts committed by identifiable people. The banking industry was cajoled and manipulated by human beings - the management that stole money in the name of borrowing, the gamblers that took depositors funds to speculate on the stock market and manipulate share prices, the billionaires and captains of industry whose wealth actually was money belonging to the poor which they "borrowed" and refused to pay back. All these have contributed largely to the distress of banks in Nigeria[6].

Just of recent, the CBN under the management of its Governor, Mr. Godwin Emefiele, removed the Boards of Directors of First Bank of Nigeria Plc and the FBN Holding because target examination revealed that the bank was in grave financial condition with its capital adequacy ratio (CAR) and non-performing loans ratio (NPL) which were substantially breaching acceptable prudential standards after a 2016 healthy banking year. The problems at

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the bank were attributed to bad credit decisions, significant and non-performing insider loans, and poor corporate governance practices. Shareholders of the bank and FBN Holding Plc also lacked the capacity to recapitalize the bank to minimum requirements. This conclusion arose from various entreaties by the CBN to them to recapitalize.

If financial intermediaries, who are one of the major drivers of economic growth, are mismanaged, what then is the future of the economy as provision of credit is instrumental to the economic development of the country? Deposit Money Banks provide credits to various sectors in the country, which the manufacturing sector is not an exemption.

The Manufacturing Sector in Nigeria comprises of Oil Refining, Cement, Food, Beverage and Tobacco, Textile, Apparel and Footwear, Wood and Wood Products, Pulp, Paper and Paper Products, Chemical and Pharmaceutical Products, Non-Metallic Products, Plastic and Rubber Products, Electrical and Electronics, Basic Metal, Iron and Steel, Motor Vehicles and assembly and other Manufacturing as reported in the Central Bank of Nigeria's statistical bulletin has not been performing encouragingly well as negative growth rates were recorded often among the years under consideration as observed by the author. For instance, the highest negative growth rate of -34.29% was recorded in 1983 while the highest positive growth rate of 19.72% in 2013. Even up till last year, 2020 with a value of ₦6.29 trillion, which resulted in a -2.79% decline in the sector's contribution to the overall Real Gross Domestic Product of the country as against the ₦6.47 trillion recorded the previous year as calculated by the author from values made available on the CBN statistical bulletin 2021.

A meticulous examination of the sectorial credit and loans made available to each sector in Nigeria from Deposit Money banks as recoded in the CBN Statistical bulletin revealed that the Manufacturing Sector has regularly received the attention of Deposit Money Banks in Nigeria with credits and advances made available to the sector from time to time. From 1981

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to 2020, which are the years under consideration in this study, the value of credits made available to the Manufacturing Sector has always increased every year, with the value of the new year greater than the previous, except for the year 2017, with the highest value of ₦3.2 trillion recorded in 2020. What then is the problem?

If sustainable development is really a goal of any country, then the manufacturing sector, among other sectors, must be looked into with utmost seriousness. With the level of goods imported in this country, Nigeria can be said to be an import dependent nation which is not good for the balance of payment position and exchange rate stability of the country.

Thus, this study aims at investigating the varying dynamic relationship between Deposit Money Banks' financial intermediation and the performance of the manufacturing sector in Nigeria both in the short-run and long-run, factoring in cost of borrowing (lending rate) and deposit interest rate as intervening variables to capture the motivating factors for both the deficit and surplus sides of the economy unlike other reviewed studies who used either of the intervening variables.

Aside that this study will serve as a recent study in the financial intermediation world, it fills the gap in literature as it is a sectorial study, picking the manufacturing sector of the country as a point of interest based on the epileptic contribution of the sector in terms of real production of goods and machineries in the country to help reduce the over dependence on imported products as against other reviewed studies that focused on economic growth of the country as a whole with only one focusing on the Agricultural sector.

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1.3 Aim and Objectives of the Study

The aim of this study is to investigate the varying dynamic relationship between Deposit Money Banks' financial intermediation and the performance of the manufacturing sector in Nigeria, factoring in cost of borrowing (lending rate) and deposit interest rate.

The objectives are to:

i. determine how effective the credit allocated to the manufacturing sector is on the performance of the sector in Nigeria.
ii. ascertain the influence of demand deposit on the performance of the manufacturing sector in Nigeria.
iii. investigate the impact of loan-to-deposit ratio on the performance of the manufacturing sector in Nigeria.
iv. test the effect of deposit interest rate on the performance of the manufacturing sector in Nigeria.
v. investigate the impact of lending interest rate on the output of the manufacturing sector in Nigeria.

1.4 Research Questions

1. How effective is the credit allocated to the manufacturing sector on the performance of the sector in the Nigerian economy?
2. To what extent does demand deposit influence the performance of the manufacturing sector in Nigeria?
3. What is the impact of loan-to-deposit ratio on the performance of the manufacturing sector in Nigeria?
4. Does deposit interest rate have any effect on the performance of the manufacturing sector in Nigeria?

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5. What is the impact of lending interest rate on the output of the manufacturing sector in Nigeria?

1.5 Hypotheses

The hypotheses of this study are stated in the null, they are as follows:

H_O1: Credit allocated to the manufacturing sector does not have a significant impact on the performance of the manufacturing sector in Nigeria.

H_O2: Demand Deposit does not significantly influence the performance of the manufacturing sector in Nigeria.

H_O3: Loan-to-Deposit ratio does not significantly stimulate the performance of the manufacturing sector in Nigeria.

H_O4: Deposit interest rate does not have significant effect on the performance of the manufacturing sector in Nigeria.

H_O5: Lending interest rate does not have a significant impact on the performance of the manufacturing sector in Nigeria.

1.6 Significance of the Study

This study is significant as it contributes to knowledge in the following ways. First, aside that this study serves as a recent study in the financial intermediation world, it fills the gap in literature as it is a sectorial study, picking the manufacturing sector of the country as a point of interest based on the epileptic contribution of the sector in terms of real production of goods and machineries in the country to help reduce the over dependence on imported products as against other reviewed studies that focused on economic growth of the country as a whole with only one focusing on the Agricultural sector.

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Secondly, since financial intermediation involves getting financial resources from the surplus side of the economy to the deficit side of the economy, including both deposit interest rate and lending interest rate in this study as intervening variables was seen as important. Past reviewed studies only included either of the interest rates but not both. This study included both interest rates to achieve robust empirical findings which will concern both sides of the economy.

Lastly, this study advances existing literatures and serve as a guide for other researchers who could be interested in the subject matter and also good for policy making by policy makers as the empirical results from the used methodologies are appropriate, valid and reliable.

1.7 Scope of the Study

The study, which is a time series analysis, covers from 1981 to 2020 as years under consideration, with data sourced from the Central Bank of Nigeria's (CBN) statistical bulletin. All variables were logged for uniformity in empirical analysis due to their different units of measurements.

1.8 Limitations of the Study

After the completion of this study, a major limitation which was not considered at the inception of this study was the introduction of inflation as an explanatory variable so as to measure the effect of inflation on the loans got by the manufacturing sector from deposit money banks in Nigeria. Further studies could see into this. Another limitation was the unavailability of 2021 data on the CBN statistical bulletin as at when the analysis of this thesis was done.

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1.9 Operational Definition of Terms

(1) Financial Intermediation: Financial intermediation is the process of transferring financial resources from those who have excess or surplus to those that would like to use those funds for purposes like investments. The role of financial intermediaries is to channel funds from lenders to borrowers by intermediating between them.

For the scope of this study, only the financial intermediation of Deposit Money Banks was considered and this was measured using five different variables. They are:

- **Cost of Borrowing (Lending Interest Rate):** Lending rate is the rate banks and other financial institutions use to lend funds in the form of loans to their customers. In other words, it is the price that people pay to borrow money. When the borrower is to pay back the loan, they pay interest with the capital borrowed. This variable was obtained as a secondary data using Prime Weighted Lending Rate.
- **Demand Deposits:** These are deposits kept in commercial banks by their customers which can be requested for at any time without any prior notice. Transferable deposits were added and were all measured in billion naira as secondary data.
- **Deposit Interest Rate:** Deposit interest rate is the rate paid by commercial banks on cash deposits of account holders. For example, a deposit interest rate will most times be paid for cash deposited by depositors into savings account. Savings Weighted Average Deposit Rate in percentage from the Central Bank statistical bulletin was used to measure this.
- **Deposit Money Banks' Credits to the Manufacturing Sector:** This is the value of credits and advances particularly made available by Commercial Banks to the Manufacturing Sector. This secondary data was measured in billion naira.

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- **Loan-to-Deposit Ratio:** From its name, this ratio is used to assess a bank's liquidity. This is done by comparing a bank's total loans to its total deposits in the same period. The higher the LDR, the greater the third party funds used for lending, which means that the bank has been able to carry out its intermediation function well. This secondary data was measured in percentage.

(2) Manufacturing Sector Performance: Manufacturing is the transformation or conversion of raw materials into semi- finished or finished products, usually on a large scale. For instance, petroleum is the raw material refined into various fuels and several chemicals and end products. The manufacturing sector of Nigeria comprises of other twelve sub-sectors.

The performance of the Manufacturing Sector, which is one of the sectors in Nigeria that contributes to the Real Gross Domestic Products of the country, was measured based on the sector's contribution to RGDP. This was measured in billion naira as recorded in the Central Bank statistical bulletin.

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Endnotes

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Chapter Two

Literature Review

It is of utmost importance to peruse previous studies conducted by different researchers on the topic of interest. In this chapter, the important concepts were introduced, explained and presented as a framework, followed by the theoretical review which considers the various existing theories on the carefully selected variables. The empirical review follows the theoretical review and considers the various researches already carried out by different researchers relating to this thesis topic using data of developed and developing countries or both as panel analysis including methodologies, results and their recommendations. The chapter finally concludes with the summary of gaps in literature.

2.1 Conceptual Review

2.1.1 Manufacturing Output Growth

Manufacturing is the conversion of raw materials into semi- finished or finished products, usually on a large scale. For instance, petroleum is the raw material refined into various fuels and several chemicals and end products. The Manufacturing Sector, which is one of the sectors in Nigeria, contributes to the Real Gross Domestic Products of the country, a common proxy for economic growth. A good understanding of economic growth is therefore important.

Economic growth is a rise in the productive capacity of a country in terms of economic goods and services, compared from one period of time to another. It is measured either in nominal or real terms (adjusted for inflation). It is expressed as the numerical real increase in the production capacity of the economy or real gross domestic product in a certain period in an economy[1]. Economic growth can also be said to consist of changes in material production of a country during a period of time, usually a year. Countries strive towards economic

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development, which is an offshoot of economic growth. Economic development is not just an increase in material production, but also all the other socioeconomic processes which has a positive impact on the well-being of the citizens of a country. Economic development is said therefore to be qualitative rather than quantitative.

Among metrics used in measuring aggregate economic growth are the gross domestic product (GDP) and the gross national product (GNP). In general terms, there are two major sources of economic growth. These are growth in the size of workforce and increase in their productivity in terms of output per hour spent working. Either can increase the overall size of the economy but only strong productivity growth can increase per capita GDP and income. Three main drivers of economic growth are: accumulation of capital stock, increase in labour inputs, such as workers or hours worked and technological advancement.

Growth accounting measures the contribution of each of these three factors to the economy. Thus, a country's growth can be broken down by accounting for what percentage of economic growth comes from capital, labour and technology.

Technological progress is the main driver of long-run growth. The explanation is actually quite straightforward. Holding other input factors constant, the additional output obtained when adding one extra unit input of capital or labour will eventually decline, according to the law of diminishing returns. As a result, a country cannot maintain its long-run growth by simply accumulating more capital or labour. Therefore, the driver of long-run growth has to be technological progress.

GDP can be measured in three different ways: the value added approach, the income approach (how much is earned as income on resources used to make good and services), and the expenditures approach (how much is spent on goods and services).

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Expenditure approach as one of the three approaches to calculating GDP, involves adding up all spending on final goods and services in an economy; the expenditures approach categories this spending into five categories: consumption (C), investment (I), government spending (G), exports (X), and imports (M): Y= C + I + G + X – M. Income approach as a method of calculating GDP involves adding up all the income earned within the borders of a country in a given year; the income approach adds up wages, rents, interest and profits. Lastly, the value-added approach to calculating GDP involves adding up all of the value added at various stages of production.

Economic growth is therefore quantitative in nature. Economic growth becomes economic development when there are significant impacts in the lives of the citizens through creation of jobs in new sectors such as the service sector, increase in human capital, reduction in inflation rate and other qualitative changes that yield significant increase in the standard of living of the citizens.

Unfortunately, Nigeria is still struggling to develop and this further emphasizes the need to invest in the manufacturing sector of the country, which comprises of other twelve sub-sectors. They are Oil Refining, Cement, Food, Beverage and Tobacco, Textile, Apparel and Footwear, Wood and Wood Products, Pulp, Paper and Paper Products, Chemical and Pharmaceutical Products, Non-Metallic Products, Plastic and Rubber Products, Electrical and Electronics, Basic Metal, Iron and Steel, Motor Vehicles and assembly and Other Manufacturing as reported in the Central Bank of Nigeria's statistical bulletin, has not been performing encouragingly well as negative growth rates were recorded often among the years under consideration. The highest negative growth rate of -34.29% was recorded in 1983 while the highest positive growth rate of 19.72% in 2013. Even up till last year, 2020 with a value of ₦6.29 trillion, which resulted in a -2.79% decline in the sector's contribution to the

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overall Real Gross Domestic Product of the country as against the ₦6.47 trillion recorded the previous year.

A quantitative and qualitative increase in the performance of the manufacturing sector through a real positive improvement in its contribution to the overall Real Gross Domestic Product (RGDP) among other sectors will relatively increase the value of the country's Real Gross Domestic Product.

The importance of the manufacturing sector cannot be over emphasized as it provides employment opportunities to the fast-growing population of the world. Industries lead to diversification of the economy of the country and reduce reliance on one type of product. It contributes to the earning of foreign currency to the country, for example, Nigeria earns foreign currency because of exporting crude oil. The manufacturing sector also enhances self-sufficiency; this means that such country reduces its dependence on imported goods thereby leading to the stabilization of the economy. It also fuels the development of transport and communication like the construction of roads, railways, and ports. It leads to the development of other economic activities like tourism, trade, and agriculture and reduces expenses on imports since most of the goods will henceforth be produced locally. Lastly, it encourages the improvement of social services such as education, health services, electricity, and water supply.

Manufacturing is the most important cause of economic growth. The growth of manufacturing machinery output, and technological improvements in that machinery, are the main drivers of economic growth. No machinery industries, no sustained, long-term economic growth. Machines are used to produce more enhanced machines needed for production to spur economic growth. So, these technologies reproduce themselves.

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Manufacturing industries in Nigeria compose one of the most hoped-for branches of economy in the country. In fact, with the plenty of raw materials, Nigeria can produce a lot of goods. Therefore, manufacturing industries are as important as agriculture and oil production for the general development of the country.

In 2020, Nigeria's GDP amounted to 152,32 trillion Naira, over 400 billion U.S.dollars. About 13 percent of the Gross Domestic Product was generated by the manufacturing sector. The largest contribution was given by the sector of food, beverage, and tobacco, which accounted for 4.75 percent of the country's GDP in 2020[2]. Manufacturing Output was therefore used as a proxy to measure the performance of the manufacturing sector in Nigeria as got from the Central Bank statistical bulletin of Nigeria.

2.1.2 Financial Intermediation

Finance is an underlying input to economic development as it is an engine of growth.[3]. In a country like Nigeria, which is in a haste to develop amidst serious constraints, much attention is therefore placed on the structure of her financial system and components for the mobilization of funds for economic growth[4].

Through the process of financial intermediation, financial intermediaries channel funds from people who have surplus capital (savers) to those who require liquid funds to carry out a desired activity investors). That is, savers (lenders) give funds to an intermediary institution (such as a bank), and that institution gives those funds to spenders (borrowers). This may be in the form of loans or mortgages.

There are two major forms of financial intermediation: Depository Financial Intermediaries (FIs) and Non-Depository Financial Institutions (FIs). Depository Financial Intermediations are institutions that accept money deposits and then use these to make loans. All the funds

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deposited are mingled in one big pool, which is then loaned out. The depository FIs are: commercial banks, thrifts, and credit unions. Non-Depository Financial Intermediaries on the other hand are financial institutions that do not have a full banking license and cannot accept deposits from the public. However, NDFIs also known as Non-Bank Financial Institutions (NBFIs) do facilitate alternative financial services, such as investment (both collective and individual), risk pooling, financial consulting, brokering, money transmission, and check cashing. The Non-Depository FIs are: investment banks, venture capitalists, financial companies, insurance companies, mutual funds, hedge funds, and credit-rating agencies. An efficient financial intermediation process creates a strong and functioning financial structure, generates employment opportunities, increases output level and income[5].

Other benefits of financial intermediation include value transformation, in which, borrowers who require large sums of money are helped since financial intermediaries can pool together many smaller deposits and lend large amounts of money to borrowers. This is made possible since financial intermediaries have an advantage of economies of scale. Economies of scale refer to the cost advantage experienced by a firm when it increases its level of output. This advantage arises since they can take deposits from a large number of customers and lend money to multiple borrowers. The practice helps to reduce the overall operating costs that they incur in their normal business routines. Unlike borrowing from individuals with inadequate funds to loan the requested amount, financial institutions can often access large amounts of liquid cash that they can loan to individuals with a strong credit rating.

Financial intermediation also ensures maturity transformation as depositors may only want to deposit money in the short term, or maintain a level of liquidity, whereas, borrowers may want to borrow money over a long period of time. By dealing with many customers over a long period of time, financial intermediaries can provide long-term funds to borrowers, whilst ensuring that depositors retain the level of liquidity they desire. Services of financial

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intermediaries also reduce transactional costs associated with, for example, writing contracts for borrowers and lenders. Risk is also diversified for savers in case a borrower defaults on a loan, the savers are not directly affected as the cost will be charged to the financial intermediary, not the depositors. Lending indirectly to several people by depositors rather than to only one individual helps spread risk as lending to just one person comes with a higher level of risk. Depositing surplus funds with a financial intermediary allows institutions to lend to various screened borrowers. This reduces the risk of loss through default. The same risk reduction model applies to insurance companies. They collect premiums from clients and provide policy benefits if clients are affected by unforeseeable events like accidents, death, and disease.

To the lenders, financial intermediaries have the specialist knowledge and resources to assess the risk and anticipate profitability of proposed projects, so reducing the risk to them. It is also worthy of note that there is ease of borrowing as borrowers do not need to visit many banks to secure funding, as there are a lot of them given that the borrower meets all requirements.

Economic development therefore covers both the activities of the private and public sectors, as they need bank credit to grow their businesses, but are constrained by the cost of bank credit facilities. However, increase in the cost of financial intermediation have adverse implications on the development of the Nigerian economy, as the private sector, which contributes a greater percentage to economic development will primarily depend on bank credit as a financing source for their investment, due to the absence of a developed capital market[6].

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Financial intermediation was proxied using variables such as Deposit money Banks' Credits to Manufacturing Sector, Demand Deposits, Loan-to-Deposit Ratio, Lending Interest Rate and Deposit Interest Rate.

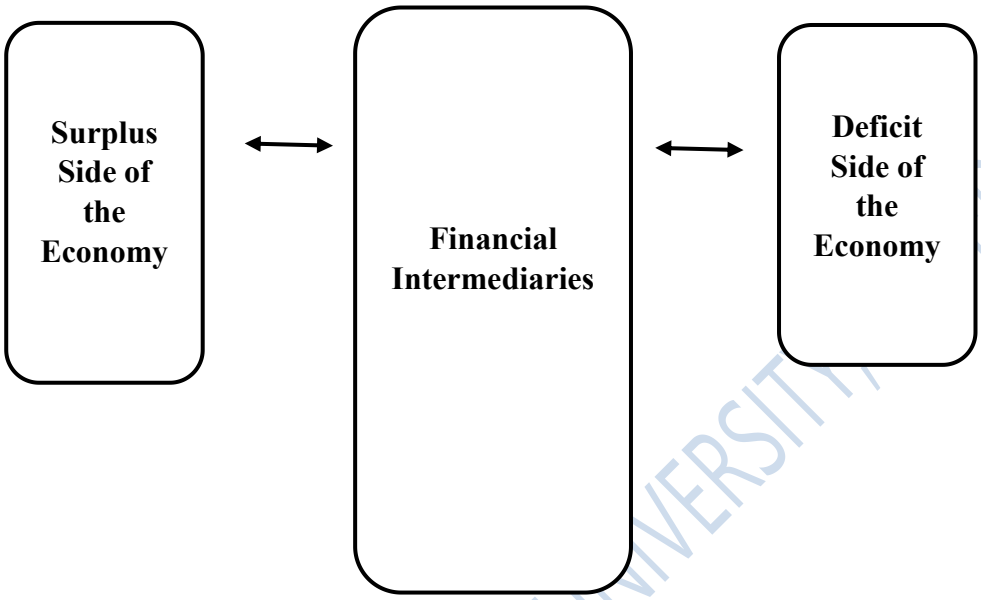

Figure 2:1Diagrammatical illustration of the relationship between financial intermediaries and the two sides of the economy. Source: Author's Compilation (2022)

2.1.2.1 Historical Development of Deposit Money Banks (Commercial Banking) in Nigeria

Activities of deposit money banks, also known as commercial banks started in Nigeria in the year 1872 as evidenced from the establishment of the African Banking Corporation (ABC) with the duty of distributing notes of Bank of England for the British Treasury[7]. Notably, three of the largest banks currently operating in Nigeria had their origin in the colonial period. For example, the Bank of British West Africa, which was later named Standard Bank, and currently called First Bank Nigeria, plc., was set up in 1894. The next commercial bank was Barclays Bank DCO, now known as Union Bank Nigeria, plc. in 1917. The British and French Bank, the precursor of the United Bank, for Africa plc, started operations in 1949. These banks were established for the provision of banking services for the British commercial interest and colonial administration in West Africa. Indeed, when the West

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African Currency Board was formed in 1912, the then Bank of British West Africa became the agent of the Currency Board. The Bank of British West Africa had until then been the chief importer of currency from the British Treasury[7].

Foreign banks dominated the Nigerian economy for a considerable long period of time. This led to criticisms from Nigerians as sketchy evidences existed that these banks only favoured expatriates and publicly discriminated against Nigerians when carrying out their banking activities especially when it involved allocation of loans and funding the development need of the country. These banks' favouritism towards their foreign owners as against caring for Nigerians and her economy, as alleged, triggered resentment which led to government securing a greater local control over the financial system and ensuring improved access to credit for the priority areas of the economy and for local businesses after independence.

A second generation of banks came into existence around the time of independence. These banks were also mainly foreign owned. They included the Banque Internationale Pour L'Afrique Occidental (BIAO) later known as Afribank Nigeria plc. Followed by this in subsequent years in the 1970s, was the establishment of commercial banks by state governments and the entrance of merchant banks which were majorly joint ventures between foreign investors and the Federal Government and/or private investors[7].

2.1.2.2 Indigenous Banking: Growth and Development

One of the special features of early banking in Nigeria was the dichotomization of banking into expatriate (foreign) and indigenous banking systems. Expatriate banks were those that were foreign-owned and incorporated outside Nigeria. Banks in this category had access to foreign liquidity from their head offices. On the other hand, indigenous banks were those owned and operated by Nigerians, with their head offices in Nigeria[7].

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The first indigenous bank to survive was the National bank of Nigeria, which came into existence in 1933. Before then, other banks that were established included the Industrial and Commercial Bank and the Nigerian Mercantile Bank. These two banks experienced failure due to insufficient capital, fraudulent practices and bad management.

In most cases indigenous banks originated from state support and assistance. The National Bank of Nigeria had an authorized paid-up capital of ₦500,000 of which only ₦l,152 was paid up initially. African Continental Bank (ACB) Ltd was the second indigenous bank, which commenced as a privately owned company under the name of Tinubu Properties in 1937, which later became Tinubu Bank Ltd in 1947. Towards the end of the same year (in November) it was registered as the African Continental Bank Ltd with an authorized capital of ₦20,000[7].

Due to post-war situations of amplified economic activity and increased export prices, numerous banks grew up in Nigeria. In the period May 1945 to January 1947, four indigenous banks were established, but only two managed to survive- the African Continental Bank and the Agbonmagbe Bank (now Wema Bank). In the period often referred to as the period of banking boom in the country, which is around 1950-51, about eighteen banks were established hastily. Unfortunately, three years after- 1954, all of them had either been voluntarily liquidated or closed down by police. Merchant Bank was the only survivor, but also finally collapsed in the early part of 1960.

The development of local banks within the Nigerian economy was indeed a very turbulent one. The collapse of many indigenous banks weakened public confidence in them. A host of factors was responsible for the failure of these banks. First, many of the banks had insufficient capital. Fourteen of the eighteen banks had a paid-up capital of less than ₦12,000 (equivalent of six hundred pounds), and this was often used to pay off the losses incurred in

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the first year. Second, many of the banks were poorly managed and lacked foresight. Third, records were either badly kept or not kept at all. Fourth, many of the banks expanded their offices too rapidly. For example, the Nigerian Farmers and Commercial Bank with a paid-up capital of about ₦26,000 had twenty-eight offices within a short time. Finally, there were no banking regulations to specify banking code of conduct. It was a period of free for all in banking industry. If there had been regulations regarding the amount of paid up capital, many of the banks that failed would not have qualified to receive a license in the first instance[7].

The attainment of regional independence or autonomy in 1954 led to the direct policy of the defunct Eastern and Western Regions. For the Western Region, the then Premier, Chief Obafemi Awolowo, encouraged indigenous banking institution in a debate at the House of Assembly, as financial empowerment to boost their capacity to provide credit facilities to Nigerian business owners with viable investments that needed funds, was one of the cardinal points of the government[7]. Three indigenous banks, which were the Merchant Bank, Agbonmagbe Bank and the National Bank of Nigeria, were found to pass the test and were assisted.

Just like for the Western Region, the policy of the then government of the Eastern Region was also to promote the growth of indigenous banks and was formulated to discourage the domination of monetary transactions by any one bank, to ease up credit facilities to Nigerian entrepreneurs, to boost the development of indigenous Nigerian banking; and to plan for the eventual establishment of a state bank[7].

As much as the original intentions of the regional governments were good, these policies were faced with some challenges. For instance, the relationship between the banks and government officials at the helms of affairs became an issue. Also, the methods of injecting public funds into indigenous banks and the use of such money became another concern.

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Unfortunately, the banks were used to foster party political interests, which led to setting up of tribunals to investigate particularly the affairs of the African Continental Bank and the National Bank of Nigeria, with different unfavourable findings. For instance, it was concluded from the report that Dr. Azikiwe's primary motive was to make available an indigenous bank with the object of liberalizing credit for the people of the country, but was also attracted by the financial power his interest in the bank would give him.[7]

At a point in the history of indigenous banking, only those who belonged to the then ruling party in the Western Region – Action Group, were considered when schemes, projects and other activities were to be carried out which also covered employment opportunities. Overtime, the finances of the National Bank of Nigeria Limited was not in good standing, with the major cause being huge loans outstanding in the names of past directors of the bank and/or persons, or companies in which they were interested; and the loans to the Action Group which were operated in various names and which were not secured in any shape or form.[7]

2.1.2.3 The Structure of the Nigerian Banking Institution

The structure of banks in Nigeria centres on a number of aspects which include the structure of ownership of banks, the size of banking and the distribution of bank branches in Nigeria. In terms of the ownership of banks in Nigeria, this went through various changes and phases over time. At inception of banking activities in Nigeria, it was mainly divided into expatriate and indigenous banks. Though there were problems with indigenous banking at inception, some of them eventually managed to survive with regional governmental support. In the evolution of banking in Nigeria, different interests developed. These interests included the participation of the Federal Government, state government and private individuals in banking[7].

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As presented in the table below showing the number of banks, their branches and location be it in urban, rural centres or in abroad for the periods 1970-2004. In the 1970s, the number of banks was less than twenty. Gradually, in 1980, Nigeria had twenty banks with a total of 740 branches. Overtime, the number of banks gradually grew to about eighty (80) in 2002 with about 2193 branches of which only about 22 percent of the total branches held abroad. The earlier years showed the urban bias in the location of bank branches. In the late 1970s, the preponderant of the bank branches were located in urban areas, more than 70 percent in the period 1971-1981. While the urban bias in the location of bank branches is still evident today, the share of bank branches in the urban areas as a proportion of total bank branches have somewhat declined from its high value of 72 percent in 1981[7].

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Table 2.1: Number of Commercial Banks and their Branches: Distribution by Location (1970- 2002)

Years	No. of Bank	Urban Branches	Urban % of Total	Rural Branches	Rural % of Total	Branches Abroad	Abroad % of Total	Total	% Total
1970	14	-	-	-	-	-	-	273	-
1971	16	-	-	-	-	-	-	318	-
1972	16	-	-	-	-	-	-	367	-
1973	16	-	-	-	-	-	-	385	-
1974	17	-	-	-	-	-	-	403	-
1975	17	-	-	-	-	-	-	436	-
1976	18	-	-	-	-	-	-	463	-
1977	19	474	96.34	13	2.64	5	1.02	492	100.00
1978	19	511	83.22	98	15.96	5	0.81	614	100.00
1979	20	533	79.32	133	19.79	6	0.89	672	100.00
1980	20	565	76.35	168	22.70	7	0.95	740	100.00
1981	20	622	71.58	240	27.62	7	0.81	869	100.00
1982	22	676	68.21	308	31.08	7	0.71	991	100.00
1983	25	694	62.64	407	36.73	7	0.63	1108	100.00
1984	27	810	64.85	431	34.59	7	0.56	1249	10000
1985	28	839	64.69	451	34.77	7	0.54	1297	100.00
1986	29	879	64.30	481	35.19	7	0.51	1367	100.00
1987	34	947	63.86	529	35.67	7	0.47	1483	100.00
1988	42	1057	63.48	602	36.16	6	0.36	1665	100.00
1989	47	1093	58.92	756	40.75	6	0.32	1855	100.00
1990	58	1169	60.29	765	39.45	5	0.26	1939	100.00
1991	65	1253	61.94	765	37.82	5	0.25	2023	100.00
1992	65	1495	65.71	774	34.02	6	0.26	2275	100.00
1993	66	1577	66.88	775	32.87	6	0.25	2358	100.00
1994	65	1634	68.00	763	31.75	6	0.25	2403	100.00
1995	64	1661	70.14	701	29.60	6	0.25	2368	100.00
1996	64	1727	71.75	675	28.04	5	0.21	2407	100.00
1997	64	1727	71.75	675	28.04	5	0.21	2407	100.00
1998	54	1466	67.09	714	32.68	5	0.23	2185	100.00
1999	54	1466	67.09	714	32.68	5	0.23	2185	100.00
2000	54	1466	66.84	722	32.92	5	0.22	2193	100.00
2001	90	1466	66.84	722	32.92	5	0.22	2193	100.00
2002	90	1500	68.39	722	32.92	5	0.22	2193	100.00
2003	90	2520	77.61	722	22.24	5	0.15	3247	100.00
2004	89	2765	79.18	722	20.68	5	0.14	3492	100.00

Source: CBN Statistical Bulletin (2005)

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Classification of branches into urban and rural stopped in 2005 due to consolidation of banks. Abroad comprises branches and subsidiaries. The number of banks reduced to 25 following consolidation of banks according to the report from the Central Bank Statistical Bulletin.

It has been noticed by analysts that the capital base of Nigerian banks is low and this may hamper their effectiveness. On July 6th 2004, the new Governor of the CBN announced at a special meeting of the Bankers Committee in Abuja, Nigeria, the first phase of the reform of the banking sector in Nigeria. Key in the new reform, banks in Nigeria are expected to build up their capital base to N25 billion from the existing N2 billion[7].

Merging and acquisition occurred in the banking industry due to this policy. From eighty-nine, banks merged to less than thirty. Presently, there are about twenty-two licensed banks in Nigeria. They are: Access Bank Plc, Citibank Nigeria Limited, Union Bank of Nigeria Plc, Eco Bank Nigeria Plc,, First Bank Plc, Globus Bank, Guaranty Trust Bank Plc, Heritage Banking Company Ltd, Fidelity Bank Plc , Keystone Bank, Polaris Bank Ltd, Providus Bank Ltd, First City Monument Bank, Stanbic IBTC Bank Plc, Standard Chartered Bank Ltd, Sterling Bank Plc, Suntrust Bank Nigeria Ltd, Titan Trust Ltd, United Bank for Africa, Unity Bank Plc, Wema Bank Plc and Zenith Bank Plc. It is worthy of note that Jaiz Bank was not added to the list of commercial banks in Nigeria because the Islamic bank is a non-interest bank. Hitherto, commercial banks still face regulations from the apex bank in order to achieve financial soundness in the banking industry in Nigeria.

2.1.3 Deposit Money Banks' Credits to the Manufacturing Sector

As defined earlier, this is the value of credits and advances particularly made available by Commercial Banks to the Manufacturing Sector. The manufacturing sector needs heavy funding and commercial banks' credits serve as financial umbrella which investors enjoy its shade.

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A careful examination of the Central Bank Statistical Bulletin from 1981 showed that the manufacturing sector topped every other sector in the sectoral distribution of commercial banks' loans and advances up on till 1996. Miscellaneous, as a sub-sector of the manufacturing sector received higher attention than the manufacturing sector intermittently across other years.

The manufacturing sector, which received ₦3,191.37 billion in the last quarter of 2020, accounted for 15.67% of the total of ₦20,373.49 billion which was made available to all the sectors in Nigeria as evidenced on the CBN statistical bulletin 2020.

2.1.4 Demand Deposits

Demand Deposits are deposits kept in commercial banks by their customers which can be requested for at any time without any prior notice. Such funds are held in demand accounts in deposit money banks. These account balances are usually considered money and form the greater part of the narrowly defined money supply of a country. As such, the money supply of a country is usually defined to consist of currency plus demand deposits.

Demand deposits can be used, through cheques and drafts, to pay for goods and services and in settling debts. For instance, during times of financial crisis, bank customers withdraw their funds in cash, leading to a drop in demand deposits and a reduction of the money supply. Economists speculated that this effect contributed to the harshness of the Great Depression.

For funds in the account, the bank or financial institution may pay either a low or zero interest rate on the deposit. The maximum a person may withdraw can be up to a certain daily limit or up to the limit of their account balance. Note that demand deposits are different from term deposits. Term deposits require depositors to wait a predetermined period before making a withdrawal. Demand deposit is also known as non-confidential money.

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A type of Demand Deposits is Checking account which is one of the most common types. It offers the greatest liquidity, allowing cash to be withdrawn at any time. The checking account may earn only zero or minimal interest since demand deposit accounts involve minimal risk. Interest paid may vary based on the financial provider.

Another type of Demand Deposits is Savings account which is a typical account at a bank or a credit union that allows an individual to deposit, secure, or withdraw money when the need arises. A savings account is for demand deposits held at a slightly longer duration compared to the short-term use of the checking account. Funds in the savings account offer less liquidity; though, for an extra fee, money may be transferred to the checking account. Savings accounts often come with a minimum required balance. As larger balances are held for extended periods in a savings account, it pays a slightly higher interest rate than a checking account.

Money market account is the last type of Demand Deposit that follows market interest rates. Market interest rates are impacted by the central bank's responses to economic activity. The money market account will, therefore, pay interest either more or less than a savings account, depending on how the market interest rate fluctuates. Traditionally, money market accounts offer a competitive rate to savings accounts.

One of the importance of Demand Deposit is that consumer spending is enhanced as consumers hold the funds used to pay for everyday expenses. Demand deposits are, therefore, advantageous due to their liquidity. With the on-demand feature of demand deposits, people can withdraw money at any time without the need to give the bank prior notice. Additional funds may be withdrawn from an ATM, debit cards, the bank's teller, or through written cheques.

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Demand deposits are also important for institutions, as the total amount held in deposit accounts determines the bank reserves. Bank reserves are the minimum cash reserves that financial institutions must keep in their vaults at any given time. The minimum cash reserve requirements that must be kept on hand. Bank reserves are held in the vault or on-site at the bank and are essential in the case of large unexpected withdrawals. The more money a bank holds in demand deposits, the more money it must keep in its bank reserves. The money not kept in bank reserves is called excess reserves. Excess reserves are then loaned out by banks, contributing to the money creation process.

Lastly, as said earlier, Demand deposits make up a significant part of the money supply in many countries, which is a combination of currency and demand deposits. So, the higher the Demand deposits, the higher the money supply in the country, ceteris paribus. During a financial crisis, many people make large withdrawals from the bank. The withdrawals will lead to a decline in demand deposits and a decrease in the money supply, with banks left with less money to loan out.

2.1.5 Loan-to-Deposit Ratio

The loan-to-deposit ratio (LDR) is used to assess a bank's liquidity by comparing a bank's total loans to its total deposits for the same period. The LDR is expressed as a percentage. If the ratio is too high, it means that the bank may not have enough liquidity to cover any unforeseen fund requirements. Conversely, if the ratio is too low, the bank may not be earning as much as it could be.

To calculate the loan-to-deposit ratio, a bank's total amount of loans will be divided by the total amount of deposits for the same period. Both figures are found on a bank's balance sheet. Loans are listed as assets while deposits are listed as liabilities. For example, if a bank has ₦400 million in deposits and ₦300 million in loans, the bank's LDR ratio would be

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calculated by dividing the total loans by its total deposits, with the result as 0.75, which is equal to 75%.

A loan-to-deposit ratio shows a bank's ability to cover loan losses and withdrawals by its customers. Investors monitor the LDR of banks to make sure there's sufficient liquidity to cover loans in case of an economic dip resulting in loan defaults.

Also, the LDR helps to show how well a bank is attracting and retaining customers. If a bank's deposits are increasing, new money and new clients are being on-boarded. As a result, the bank will likely have more money to lend, which should increase earnings. Although it's counterintuitive, loans are an asset for a bank since banks earn interest income from lending. Deposits, on the other hand, are liabilities because banks must pay an interest rate on those deposits, albeit at a low rate.

The LDR can help investors determine if a bank is managed properly. If the bank isn't increasing its deposits or its deposits are shrinking, the bank will have less money to lend. In some cases, banks will borrow money to satisfy its loan demand in an attempt to boost interest income. However, if a bank is using debt to finance its lending operations instead of deposits, the bank will have debt servicing costs since it will need to pay interest on the debt.

As a result, a bank that borrows money to lend to its customers will typically have lower profit margins and more debt. A bank would rather use deposits to lend since the interest rates paid to depositors are far lower than the rates it would be charged for borrowing money. The LDR helps investors spot the banks that have enough deposits on hand to lend and won't need to resort to increasing their debt.

The proper LDR is a delicate balance for banks. If banks lend too much of their deposits, they might overextend themselves, particularly in an economic downturn. However, if banks lend too few of their deposits, they might have opportunity cost since their deposits would be

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sitting on their balance sheets earning no revenue. Banks with low LDR ratios might have lower interest income resulting in lower earnings.

Multiple factors can drive changes in the loan-to-deposit ratios. Economic conditions can impact loan demand as well as how much investors deposit. If consumers are unemployed, they are unlikely to increase their deposits. The Central Bank regulates monetary policy by raising and lowering interest rates. If rates are low, loan demand might increase depending on the economic conditions. In short, there are many outside factors that impact a bank's LDR.

Typically, the ideal loan-to-deposit ratio is 80% to 90%. A loan-to-deposit ratio of 100% means a bank loaned one naira to customers for every naira received in deposits it received. It also means a bank will not have significant reserves available for expected or unexpected contingencies.

The LDR helps investors to assess the health of a bank's balance sheet, but there are limitations to the ratio. The LDR does not measure the quality of the loans that a bank has issued. The LDR also does not reflect the number of loans that are in default or might be delinquent in their payments. As with all financial ratios, the LDR is most effective when compared to banks of the same size, and similar makeup. Also, it's important for investors to compare multiple financial metrics when comparing banks and making investment decisions.

There are indications that the current Loan-to-Deposit Ratio policy of the Central Bank of Nigeria, CBN, is turning positive despite the macroeconomic adversities arising from the impact of Coronavirus (COVID-19) Pandemic. LDR stipulates the volume of loans a bank must give out as a percentage of its total deposit, and in this policy the loan volume is stipulated at a minimum of 65 percent of the total deposit[8].

Banks' loans increased by 5.6 percent or ₦1.2 trillion to ₦18.9 trillion in the first quarter of 2020, Q1'20, from ₦17.4 trillion as at end 2019. This was coming after the first four months

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post-new LDR which saw a significant increase in banks' loan to the economy following the CBN's policy which came into effect in September 2019. Before then loans to the economy which had risen to ₦16.1 trillion in 2016, had recorded a two consecutive years of decline first to ₦15.7 trillion in 2017 and a further declined to ₦15.1 trillion in 2018. But it picked up the most to ₦17.4 trillion in 2019, helped largely by the new LDR policy[8].

2.1.6 Deposit Interest Rate

As defined earlier, deposit interest rate is the rate paid by commercial banks or financial institutions on cash deposits of account holders. For instance, a deposit interest rate will often be paid for cash deposited into savings and money market accounts Deposit accounts include certificates of deposit (CD), savings accounts, and other investment accounts.

This is paid as an incentive to the surplus side of the economy (savers) for entrusting their financial resources with financial intermediaries like commercial banks. The higher this rate, the more motivated savers are to save, vice versa.

2.1.7 Lending Interest Rate

As defined earlier, lending rate is the rate banks and other financial institutions use to lend funds in the form of loans to their customers. In other words, it is the price that people pay to borrow money. When people make loan payments, interest is a part of the repayment. The cost of borrowing money expressed as a percentage of the amount borrowed (principal).

Investments increase economic growth. To motivate the deficit side (investors) of the economy to engage in investments, financial intermediaries, especially banks have a significant role to play with their lending rate.

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A recent decision of the MPC of the Central Bank of Nigeria (CBN) to lower both the lending and interest rate on the monetary policy rate (MPR) and the cash reserve requirement (CRR) is commendable and as the tendencies of boosting economic growth. It is predictable that the reduction in lending rate would positively affect the economy if well implemented and closely supervised by the monetary authority[9].

2.1.8 Conceptual Framework

The conceptual model is depicted in the figure below, showing the variables involved in the study as they interrelate. Deposit Money Banks' Financial Intermediation is the independent variable X while Manufacturing Sector Performance is the dependent variable Y. The sub-variables for the independent variable (Deposit Money Banks' Financial Intermediation) are Deposit Money Banks' Credit to the Manufacturing Sector, Demand Deposits, Loan-to-Deposit Ratio, Deposit Interest Rate and Lending Interest Rate while Manufacturing Output as the proxy for Manufacturing Sector Performance.

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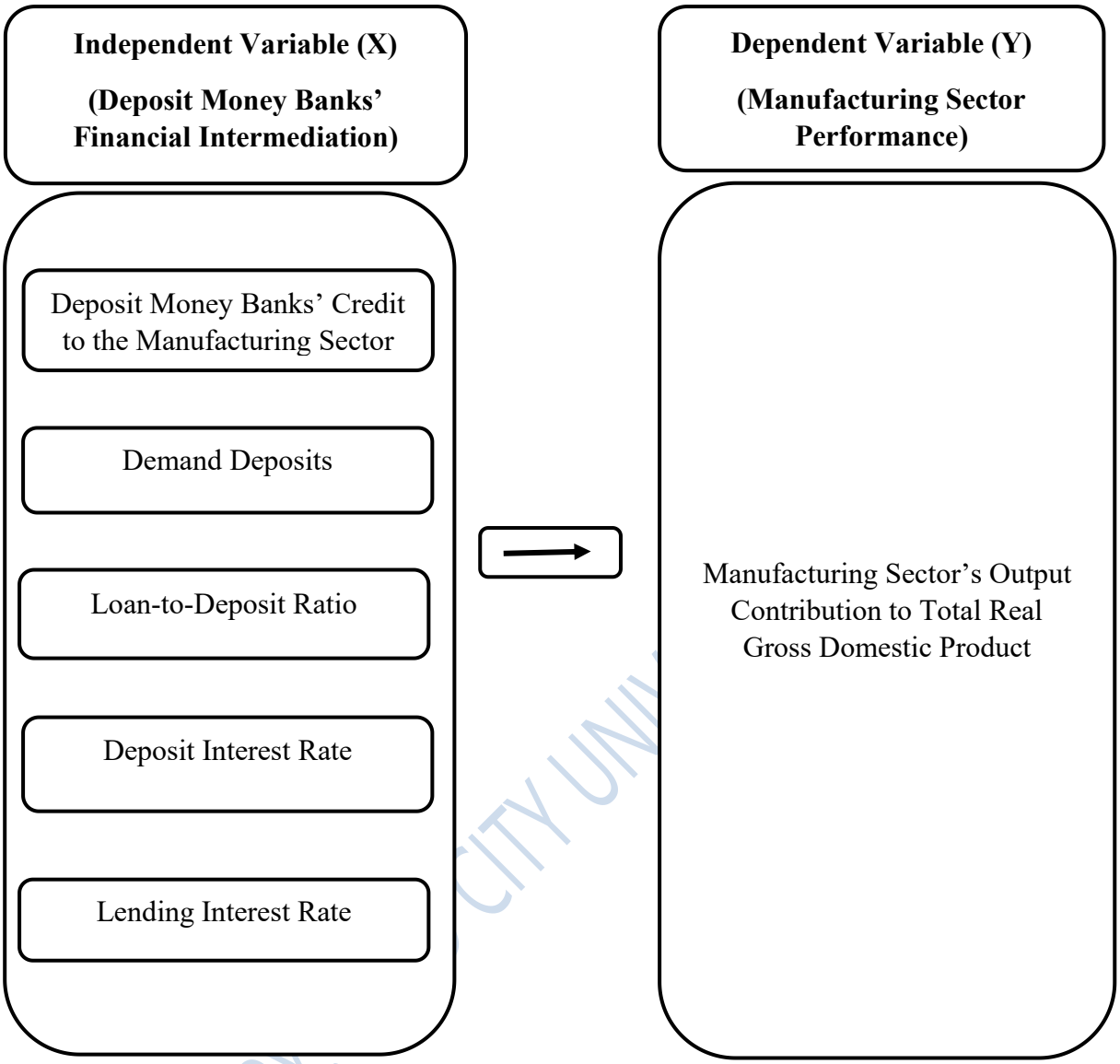

Figure 2.2 Conceptual Model ***Source: Author's Compilation 2022***

2.2 Theoretical Review

Different theories on financial intermediation and economic growth and developments have been postulated, built upon and referenced by many scholars and researchers, but reviews on economic growth and development theories for the purpose of this study were the Harrod–Domar, Endogenous and Joseph Schumpeter Growth and Development Models. As for financial intermediation, the Liquidity Transformation, Delegated Monitoring and The Information Production theories were reviewed.

2.2.1 Economic Growth Theories

2.2.1.1 Harrod-Domar Growth Model

The Harrod–Domar model is a classical Keynesian model of economic growth. It is used in development economics to explain an economy's growth rate in terms of the level of saving and productivity of capital. The model was developed independently by Roy F. Harrod in 1939 and Evsey Domar in 1946.

According to the Harrod–Domar model there are three kinds of growth: warranted growth, actual growth and natural rate of growth. Warranted growth rate is the rate of growth at which the economy does not expand indefinitely or go into recession. Actual growth is the real rate increase in a country's GDP per year. Natural growth is the growth an economy requires to maintain full employment. For example, if the labour force grows at 3 percent per year, then to maintain full employment, the economy's annual growth rate must be 3 percent.

Capital formation plays a very important role in the process of development of a country. According to the Harrod-Domar model, economic growth depends on two important factors, viz., the saving ratio (i.e., the percentage of national income saved per annum) and the capital-output ratio. Since the capital-output ratio remains constant in the short run, the rate of growth of a nation depends largely on the rate of saving.

Some of its assumptions are that a full-employment level of income already exists, there is no government interference in the functioning of the economy, the model is based on the assumption of "closed economy." In other words, government restrictions on trade and the complications caused by international trade are ruled out, there are no lags in adjustment of variables i.e., the economic variables such as savings, investment, income, expenditure adjust themselves completely within the same period of time and income, investment, savings are

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all defined in the net sense, i.e., they are considered over and above the depreciation. Thus, depreciation rates are not included in these variables.

This model has its importance. It is debated that in countries that are still developing, low rates of economic growth and development are connected to low saving rates. This creates a vicious cycle of low investment, low output and low savings. To boost economic growth rates, it is necessary to increase savings either domestically or from abroad. Higher savings create a virtuous circle of a self-sustaining economic growth. The transfer of capital to developing economies should enable higher growth, which in turn will lead to higher savings and growth will become more self-sustaining, that is increased savings will lead to increased investment which will lead to higher capital stock which in turn leads to higher economic growth. So, higher level of savings is seen as instrumental to higher economic growth.

Some of the criticisms of this model are that developing countries find it difficult to increase saving as increasing savings ratios does not look feasible when the citizens are struggling to get enough food to eat. Also, Harrod based his model on looking at industrialised countries post-depression years. He later came to repudiate his model because he felt it did not provide a model for long-term growth rates. Another criticism is that the model ignores factors such as labour productivity, technological innovation and levels of corruption. The Harrod-Domar is at best an oversimplification of complex factors which go into economic growth. It is also worthy of note that there are examples of countries who have experienced rapid growth rates despite a lack of savings, such as Thailand. This model assumes the existences of a reliable finance and transport system. Often the problem for developing countries is a lack of investment in these areas.

Another strong criticism is that increasing capital stock can lead to diminishing returns. Domar was writing during the aftermath of the Great Depression where he could assume

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there would always be surplus labour willing to use the machines, but, in practice, this is not the case. The Model explains boom and bust cycles through the importance of capital, however, in practice, businesses are influenced by many things other than capital such as expectations. Harrod also assumed there was no reason for the actual growth to equal natural growth and that an economy had no tendency to full employment. However, this was based on the assumption of wages being fixed.

Another criticism is the difficulty in influencing saving levels especially in developing economies because of widespread of poverty. Also, the effectiveness of foreign capital flows can vary. In the 1970s and 80s, many developing economies borrowed from abroad, this led to an inflow of foreign capital however, there was a lack of skilled labour to make effective use of capital. This led to very high capital-output ratios (poor productivity) and growth rates didn't increase significantly. However, developing economies were left with high debt repayments and when interest rates rose, a large proportion of national savings was diverted to paying debt repayments.

Lastly, Economic development implies much more than just economic growth. For example, who benefits from growth? Does higher national income filter through to improved health care and education? It depends on how the capital is used.

Conclusively, the model implies that economic growth depends on policies to increase investment, by increasing saving, and using that investment more efficiently through technological advances. The model concludes that an economy does not "naturally" find full employment and stable growth rates.

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2.2.1.2 Endogenous Growth Model

Endogenous growth theory is an economic theory which argues that economic growth is generated from within a system as a direct result of internal processes. More specifically, the theory notes that the enhancement of a nation's human capital will lead to economic growth by means of the development of new forms of technology and efficient and effective means of production. In neo-classical growth models, the long-run rate of growth is exogenously determined by either the savings rate (the Harrod- Domar model) or the rate of technical progress (Solow model). However, the savings rate and rate of technological progress remain unexplained. Endogenous growth theory tries to overcome this shortcoming by building macroeconomic models out of microeconomic foundations.

The endogenous growth theory offered a fresh perspective on what drives economic growth. It argued that a persistent rate of prosperity is influenced by internal processes such as human capital, innovation, and investment capital, rather than external, uncontrollable forces, challenging the view of neoclassical economics.

Exogenous (external) growth factors include things such as the rate of technological advancement or the savings rate. Endogenous (internal) growth factors, meanwhile, would be capital investment, policy decisions, and an expanding workforce population.

In other words, the endogenous growth theory was first created due to deficiencies and dissatisfaction with the idea that exogenous factors determined long-term economic growth. In particular, the theory was established to refute the neoclassical exogenous growth models, as it made predictions about economic growth without factoring in technological change.

The endogenous growth theory challenges such an idea by placing importance on the role of technological advancements. Since long-term economic growth is derived from the growth

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rate of economic output per person, it would depend on productivity levels. In turn, productivity would depend on the progress of technological change, which relies on innovation and human capital; these factors are considered internal to an economy, not external.

Some of the assumptions of the theory are that there is the presence of the government, who provide incentives and subsidies for businesses in the private sector. It motivates businesses to invest in research and development so they can continue to drive innovation. The model also holds that there are increasing returns to scale by investing in human capital through education or training programs as doing improves the quality of labour, which increases productivity. The government also enacts policies that help entrepreneurs and gives incentives to reward intellectual property rights, such as copyrights and patents, which are incentives for businesses to expand their operations.

The exogenous growth theory often draws criticisms for relying on assumptions that cannot be assessed accurately, as there is no empirical evidence to validate the theory. In some endogenous growth models, some may also argue that the difference between physical capital and human capital is not distinct. Others may also argue that the endogenous growth theory disregards the role of organizations and places too much weight on human capital.

In summary, the theory focuses on positive externalities and spill over effects of a knowledge-based economy which will lead to economic development. The endogenous growth theory primarily holds that the long run growth rate of an economy depends on policy measures. For example, subsidies for research and development or education increase the growth rate in some endogenous growth models by increasing the incentive for innovation. An endogenous growth theory implication is that policies that allow openness, competition, change and innovation will promote growth. Conversely, policies that have the effect of

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restricting or slowing change by protecting or favouring particular existing industries or firms are likely, over time, to slow growth to the disadvantage of the community.

2.2.1.3 Schumpeter Theory of Economic Growth and Development

The relationship between financial development and economic growth has received a great deal of attention throughout the modern history of economics. Its root can be traced to the work of Schumpeter (1959) who argued that financial services are paramount in promoting economic growth. In his view, production requires credit to previously become a debtor.

Financial intermediaries mobilize savings, allocate capital, manage risks, ease transaction costs and monitor firms' activities which are essential for economic growth and development. This concept links financial intermediation and economic growth through the increment in the fraction of resources society saves and by improving on the way in which financial intermediaries mobilize savings[10].

Four main features of Schumpeter's Theory of Economic Development are: circular flow, role of entrepreneur, cyclical process or business cycle and end of capitalism. He believed that development process implies a condition where economic activity produces itself continuously at constant rate through time without destruction and as a result, entrepreneurs or innovators as the key figure holding a central place in development initiates this development in a society and carries it forward. As much as the creation of bank credit is assumed to accelerate money incomes and prices in the economy in his theory, development comes with different phases of ups (booms) and downs (recession). With booms, cumulative expansion throughout the economy is created. With the increase in the purchasing power of the consumers, the demand for the products increases in relation to supply. The rising prices and the high rates of profits stimulate producers to raise investments by borrowing from the banks. The opposite occurs during depression.

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Schumpeter believes in the existence of the long wave of upswings (or boom) and downswings (or depression). Once the upswing ends, the long wave of downswing begins and the painful process of readjustment to the "point of previous neighbourhood of equilibrium" starts. The cyclical swings are the cost of economic development under capitalism as the continuous technical progress results in an unbounded increase in total and per capita output. As long as technological progress takes place, the rate of profit is positive. Hence, there can be no drying up of sources of investible funds nor any vanishing of investment opportunities. Nevertheless, the economic success of capitalism will eventually lead to its decay. Due to its drawbacks, capitalism disintegrates and yields place to socialism.

2.2.2 Financial Intermediation Theories

2.2.2.1 Liquidity Transformation Theory by Beninvenga and Smith (1991)

Financial intermediary can substantially reduce transaction costs because they have developed expertise in lowering them. Their size allows them to take advantage of economies of scale, because of the reduction in the transaction costs per transaction as the scale of transaction increases. Consequently, financial intermediaries are able to reduce transaction costs substantially, by making it possible for depositors to provide funds indirectly to borrowers for investment opportunities.

This theory stressed that efficient financial intermediation stimulates savers to hold their wealth increasingly in productive assets contributing to productive investment and stimulates economic growth. Against this backdrop, financial institutions deposit can be seen as credit agreements that present high liquidity and low-risk assets[11].

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2.2.2.2 Delegated Monitoring Theory by Diamond (1984)

One of the famous theories that explained the existence of banks and other financial institutions, their activities and interactions described the banking roles as an entity that follows and verifies debtors. The theory posits that it is more efficient for the commissioning unit (depositors) to delegate debtors monitoring function to some specialized entity (financial institutions) because they have the expertise and enjoy the economies of large scale in processing information on credit risks. The theory emphases that financial institutions especially banks have a net comparative advantage on the cost of transactions in relation to direct financing. The theory developed two premises, first was on the diversity of investments, which explained the advantages of delegated monitoring by financial intermediaries than by individual creditors.

Secondly, the financial intermediary that performs the delegated monitoring function of debtors has large components that enable them to finance more clients, considering the fact that diversification leads to an increase in credit strength of financial institutions. This entails that financial intermediary due to their large scope facilitates portfolio investments and managements than any individual creditor.

2.2.2.3 Information Production Theory

Surplus units could incur substantial search costs if they were to seek out borrowers directly. If banks did not exist, then there would be duplication of information production costs as surplus units would individually incur considerable expenses in seeking out the relevant information before they committed funds of specializing agents such as banks that choose to produce the same information[12].

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2.2.3 Supply Leading Theory of Finance – Economic Growth Nexus

The supply leading theory postulates that the existence of financial institutions like the Nigerian deposit money banks and other financial intermediaries and the supply of their financial assets, liabilities and related financial services in advance of demand for them would provide efficient allocation of resources from surplus units to deficit units, thereby leading to other economic sectors in their growth process. This theory performs two functions: first, it transfers resources from traditional sectors to modern sectors; and second, it promotes and stimulates an entrepreneurial response in the modern sectors. The supply leading financial intermediation can be linked to the term 'innovation finance'. Hence, one of the most significant effects of supply leading approach is that, as entrepreneurs have new access to the supply leading funds. Their expectation increase and new horizons as to possible alternatives are opened, thereby making the entrepreneur to think big. The supply leading theory presents an opportunity to induce real growth by financial means[13].

It is worthy of note that of all the reviewed theories relating to key variables above, the Endogenous Growth Model is the theory that underpins this study. The reason for this being the fact that this theory holds that economic growth is generated from within a system as a direct result of internal (endogenous) variables as opposed to external (exogenous) variables. Growth and development to the manufacturing sub-sector of the industrial sector will largely influence the country's growth. A meticulous observation into all the variables used to proxy both the dependent and independent variables are all internally induced factors. These variables are: Deposit Money Banks' Credit to the Manufacturing Sector, Demand Deposits, Loan-to-Deposit Ratio, Deposit Interest Rate, Lending Interest Rate and the Manufacturing Sector's Output.

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2.3 Review of Empirical Studies

Different scholars and researchers have investigated into the subject matter of financial intermediation and economic growth in various economies. There have been different results and interpretations based on outcomes from different methodologies, using different proxies for the explained and explanatory variables in investigating the relationship and dynamic linkage between financial intermediation and economic growth.

Also, various studies have been carried out in different countries and the policy implications drawn from these researches have also varied considerably depending on whether the countries involved were developed or developing.

2.3.1 Developed Counties

Financial intermediary development is the main driving force of economic growth in United Kingdom and The United states of America among other 13 countries. Using the Quantile Regression Method (QRM), the empirical results further revealed that in a high-income country, the more the deposits that are stored in commercial banks as the proxy for the size of the banking system, the stronger is its economic development. That is, in high-income countries, the development of financial intermediaries has a positive impact on economic growth. Accordingly, high-income countries should encourage the development of financial institutions to promote economic development as the size of the financial intermediaries in a country is relevant because it influences the number and amount of loans banks can lend to companies. Therefore, the ratio of deposit money bank assets to total assets of financial institutions is positively related to economic development. But it was revealed that according to the GDP growth rate of each country, high-income countries possessing low and stable economic growth have a lower rate of economic growth; whereas low-income countries with fast and volatile economic growth are considered have a higher rate of economic growth[14].

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Also in Canada, Norway, Ireland, Germany for example, there is a positive influence of financial development on economic growth from the use of multiple regression methodology with four non-overlapping 5-year periods. The region's financial systems have become deeper and more diversified since the early 1990s[15].

There is a statistically significant positive relationship between credit union financial intermediation and economic growth in developing / emerging countries like Indonesia and Philippines using the panel Generalized Method of Moments (GMM) estimation technique[16] as against financial intermediation found to be negatively correlated with economic growth in Singapore and other four Asian emerging countries – Indonesia, Malaysia, Philippines and Thailand using Generalized Least Square (GLS) method on the ratio of private domestic credit to GDP as an indicator of financial intermediation, factoring inflation into the model. It concluded that the financial intermediation sector in Southeast Asia during the study period was not a factor driving Southeast Asian economic growth. However, there was a tendency for the financial intermediation sector in Southeast Asia to hamper its economic growth[17].

In Turkey, financial intermediation significantly influences economic growth in both the short and long run using the Autoregressive Distributed Lag (ARDL) model. However, the effect is positive only in the short run. The results evidenced a significant negative impact of financial intermediation on economic growth in the long run. This suggested that banks' intermediation does not enhance growth in the long run. The negative relationship can be ascribed to the episodes of macroeconomic instability the country encounters. These macroeconomic shocks negatively affect banks' intermediation activities[18].

2.3.2 Developing Countries

Broad Money Supply (BMS), Size of Credit (SCR) and Credit delivered to the Private Sector (CDP) which were proxies of financial intermediation in Nigeria using the Ordinary Least

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Square (OLS) and Vector Error Correction Model (VECM) approach between 1983 - 2018, showed that financial intermediation had a statistical significant impact on economic growth. There is a positive relationship between RGDP and each of BMS, SCR and CDP. The result is significant for all the variables above except for BMS since their p-values were less than 0.05. The relationship between Bank Deposits (BD) and RGDP was negative suggesting that if RGDP increases BD reduces recommending that there should be a reduction in lending rate associated with the size of credit, increased volume of credit delivered to the private sector, sustenance of on-going reforms and evolving measures to boost deposit mobilization which would spur investment, innovation and engender growth in the Nigerian economy and also, there should be a review of monetary policy by the apex bank, the Central Bank of Nigeria (CBN) with the goal of increasing money supply so as to be able to reduce the costs of borrowing[12].

Net domestic credit, which was adopted as the exogenous variable and proxy for financial intermediation and gross domestic product as the endogenous variable and proxy for economic performance indicator, had a positive and significant impact on gross domestic product in Nigeria using the Ordinary Least Square Regression (OLS) technique. The general economic implication of the results was that net domestic credit and optimal allocation of credit is a veritable instrument for economic growth in Nigeria[11].

Using the Autoregressive Distributed Lag (ARDL) model, there was a stable long-run relationship amongst used variables, where total deposit, total savings and credit to private sector were proxies for financial intermediation and gross domestic product as the dependent variable in Nigeria. Also, there is a statistically significant positive short-run and long-run relationship between financial intermediation and economic growth[19].

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Despite the rapid growth of the financial sector, financial intermediation and financial deepening were concluded to be low by international standards. The low levels of these indicators depict Ghana's financial sector as being "shallow." From the banking sector's point of view, the persistently high cost of credit was primarily the result of competitive government borrowing, high cost of bank funds, and high borrower risks. These causes reflect widely-perceived views regarding the high cost of credit in Ghana. Another important factor that did not, unexpectedly, come out of the survey is the uncompetitive nature of the banking sector that sustains high lending rates and spreads[20]. Still in Ghana, a negative long-run relationship between domestic banks credit to the private sector and Ghana's economic growth was established, though statistically insignificant at 5% significance level using ARDL bounds testing approach. In the short-run however, the negative relationship between the two variables is statistically significant at the same significance level[21].

Further, financial intermediation had a positive significant impact on the economic growth of Pakistan in both long run and short run using the ARDL approach, where GDP per capita was used for economic growth and credit to the private sector used as a proxy for financial intermediation. The study concluded that Pakistan should develop modern and stable financial institutions in order to enhance the ability of the financial sector to lend more which in turn creates investment opportunities that contribute to economic growth and development eventually[22].

On agricultural performance in Nigeria, bank financial intermediation had no significant effect on the performance of the sector using the Auto Regressive Distributed Lag (ARDL) model on yearly data during the period under consideration[23]. This was against the disaggregated approach of investigating the effect of financial intermediation on the economic growth of Nigeria using Engle – Granger Representative Theorem of Error

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Correction. Among the disaggregated sectors was agriculture to ascertain the effect of disaggregated credit to the private sector on economic growth. The results revealed that loans and advances to agriculture, among other considered sectors, had a significant influence on economic growth[24].

Bank intermediation has a statistically significant impact on economic growth of Nigeria using OLS approach. Loan and advances and money supply were used as proxies for financial intermediation. Both variables were found to have positive effect on economic growth with long-run relationship established among the variables. Among other recommendations, an improvement on the interest paid to depositors on their deposits with banks was given[25].

On the other hand, credit to private sector was found to have a negative effect on real GDP growth rate of Nigeria using the Autoregressive Distributed Lag (ARDL) model, which informed a major recommendation that the monetary authority create policies to oblige banks to lower their lending rates to encourage the productive sectors of the economy to perform better[3]. Financial intermediation was affirmed to have a significant positive effect on economic growth in Nigeria with private sector having significant positive impact on the development of the Nigerian economy but unfortunately, the level of lending rate over the years impacted negatively on economic growth[26].

In terms of causality, in Nigeria for example, there exist a causality flow between Real Gross Domestic Product (RGDP), Insurance Intermediation Ratio (IIR) and Private Sector Credit (PSC) with causality flowing from RGDP to financial Intermediation indicators (IRR and PSC) respectively using the Granger non-causality test. Judging by the output of this research, it showed that in the Nigeria context, economic growth determines financial sector development. This suggests that the financial intermediation activity in Nigeria is demand

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following while the economy is leading. The economic implication of this is that the financial sectors out-rightly rely on the growth of the economy[27]. This was contrary to the Toda-Yamamoto Granger non-causality test performed in Nigeria, which revealed that causality was absent between financial intermediation and economic growth. This called for the conclusion that financial intermediation was not a determinant of economic growth. The study further recommended that government should design and implement reforms that would increase the banks' capacity to intermediate funds to the real sector as well as deepen the financial sector[28].

Finally, capital market, which is a constituent of the financial system in Nigeria, had a significant effect on the economic growth in a study on financial development and economic growth nexus in Nigeria using the Ordinary Least Squares (OLS) method of analysing. This possibly implied that a good percentage of the credit introduced to the economy is placed on money market instrument thereby neglecting the capital market instruments[29].

2.4 Summary of Gaps in Literature Reviewed

The study reviewed various literatures on the relationship between Financial Intermediation and Economic growth in Nigeria and in other countries. These studies made use of different variables to proxy the dependent and independent variables making use of various methodologies to arrive at various results. Some results agreed with past results from previous authors, while some did not. Some authors concluded that financial intermediation had a significant impact on economic growth, but did not specify if the impact was positive or negative. Some authors used intervening variables such as deposit interest and lending interest rates, checking the effects of these interest rates on the performance of the economy. As much as many authors agreed that high lending rate had negative impact on the growth of the Real Gross Domestic Product, RGDP per capita and on other variables used to proxy the

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dependent variable; few got a positive relationship between them. After meticulously reviewing past literatures, aside the fact that this study will be the latest in the subject matter of financial intermediation, it was observed that all the authors focused on relationship between financial intermediation and the growth of the economy as a whole, with the exception of one author, who had a sectoral investigation of the impact of financial intermediation on the performance of the Agricultural Sector of Nigeria.

This study broke down the subject matter of financial intermediation, focusing on Deposit Money Banks' Financial intermediation to capture the significance of the financial intermediation of commercial banks, not on the economy as a whole like most authors, but on the performance of the manufacturing sector, using both the deposit and lending interest rates, which no past study had done. This was informed based on the importance of a healthy manufacturing sector to the economic development of any nation as Nigeria is over-import dependent. Thus, this study investigated into the varying dynamic relationship between Deposit Money Banks' financial intermediation and the performance of the manufacturing sector in Nigeria in both the short and long run, factoring in cost of borrowing (lending rate) and deposit interest rate.

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Chapter Three

Methodology

In this chapter, issues as related to the sources, measurement, nature and feature of the data used in the thesis are discussed and thereafter defines the theoretical and analytical framework as well as the methodology engaged so as to give a detailed and empirically sound analysis of the relationship between Deposit Money Banks' financial intermediation and the performance of the Manufacturing Sector in Nigeria.

The chapter also discusses the methods adopted in investigating the relationship between Deposit Money Banks' financial intermediation and the performance of the Manufacturing Sector in Nigeria. It is sub-divided into sections, the first section sets out the research design employed; the second section contains the population of the study, while the third sets out the sample and sampling techniques. Other sections address data description which includes data issues, data measurement and sources and justification of variables, estimation techniques used which includes descriptive statistics, graphical analysis, unit- root and co-integration tests.

3.1 Research Design

The study adopted the quantitative research design for testing the study's objectives by examining the relationship among the variables since these variables can in turn be measured, typically on instruments, so that numbered data can be analysed using statistical procedures.

3.2 Population of the Study

The population of this study are the twenty two approved and licensed Deposit Money Banks in Nigeria, the country also known as the Giant of Africa. Nigeria is located in western Africa on the Gulf of Guinea and has a total area of 923,768 km^2 (356,669 sq mi), making it the

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world's 32nd-largest country. Its current population size is 212,038,975 according to Worldometer in August 2021. The country got her independence on the 1st of October, 1960 and became a republic in 1963. It has 36 states and a member of Economic Community of West African States (ECOWAS).

These twenty two licensed banks have branches all over the country and abroad.

Figure 3.1: Map of Nigeria (Author's Compilation) 2022

3.3 Sample and Sampling Technique

Based on the small size of the population of this study, being just the twenty two licensed deposit money banks in Nigeria, all these Deposit Money Banks form the sample for this study as secondary data aggregated and compiled already for all these banks on the CBN statistical bulletin was used based on the nature of this thesis.

The sampling technique used is non-probabilistic. Precisely, purposive sampling technique was used in selecting data and its sources. Purposive sampling method was adopted to achieve a specific purpose which is to investigate the dynamic relationship between financial intermediation activities of only deposit money banks on the performance of the manufacturing sector in the country. So, variables that are informative and are crucial at achieving the set objectives of the study were selected.

The approach for this study was purely quantitative. Secondary data relating to deposit money bank's financial intermediation and the growth of the manufacturing sector were sourced majorly from the Central Bank of Nigeria (CBN) statistical bulletin. Deposit Money Banks' Financial Intermediation is the independent variable X while Manufacturing Sector Performance is the dependent variable Y. The sub-variables for the independent variable (Deposit Money Banks' Financial Intermediation) are Deposit Money Banks' Credit to the Manufacturing Sector, Demand Deposits, Loan-to-Deposit Ratio, Deposit Interest Rate and Lending Interest Rate while Manufacturing Output as the proxy for Manufacturing Sector Performance. Deposit Interest Rate (DIR) and Lending Interest Rate (LIR) were introduced as intervening variables in the model.

3.4 Data Sources

This study made use of annual secondary data of Nigeria from 1981 - 2020. Data for Deposit Money Banks' Credit to the Manufacturing Sector, Demand Deposits, Loan-to-Deposit Ratio, Deposit Interest Rate and Lending Interest Rate as proxies for the explanatory variable while Manufacturing Output as the proxy for the explained variable. The data were sourced from statements of accounts of commercial banks and statistical bulletins from the Central Bank of Nigeria (CBN).

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3.5 Measurement of Variables

The variables used in the analysis of this study were measured as follows; Deposit Money Banks' Credit to the Manufacturing Sector, Demand Deposits and Manufacturing Output, i.e sectorial contribution of the manufacturing sector to the total Real Gross Domestic Output (RGDP) were all measured in million naira while Loan-to-Deposit Ratio, Deposit Interest Rate and Lending Interest Rate were measured in percentage.

3.6 Estimation Technique(s)

3.6.1 Pre – Estimation

Descriptive Statistics: Running descriptive statistics is crucial to understand the behaviour and distribution of the data set before estimation. The descriptive statistics gives detailed information about the data set to be used. They include: mean, median, maximum, minimum, standard deviation, skewness, kurtosis and Jarque – Bera test.

Graphical Analysis: This gives a pictorial representation of the behavior of the data set. It depicts the trend components and pattern of movement of each variable. In a bivariate distribution, a graphical analysis is also used to show the relationship between the variables.

Further preliminary tests that are necessary in order to understand the stochastic processes that can cause problems in estimation and results are the unit root test and cointegration test.

Unit Root Test: This test is used to examine the stationarity of the variables to be used. It examines the stability and reversion of the mean, covariance and auto – covariance of the variables. In this study, the unit root test is used to determine the order of integration – I (0) or I (1) – of the variables which helps with choosing the appropriate and suitable method of estimation.

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Cointegration Test: This is used to ascertain the existence of long-run relationship or equilibrium among series where at least one of the series considered is not stationary. Hence, two or more series are said to be co-integrated if their linear combination is stationary i.e. there is a true long run relationship between or among them. The prominent co-integration tests include Engle-Granger co-integration test, Bounds test and Johansen co-integration test.

3.7 Theoretical Framework

3.7.1 The Endogenous Growth Model

The theoretical framework of this study is built on the Endogenous Growth Theory, which has been used in a previously reviewed study[1]. This theory holds that relevant policy measures are key determinants of long-run growth rate of an economy, which also suggests that long-run growth rate is determined by variables within the model, and not exogenously determined by technological progress as postulated by Neo-Classical Growth Theory. The functional, mathematical and econometric models are specified in the next section.

Based on the sectorial angle of this study, variables that suit it were introduced in the model specification in the next sub-section.

3.7.2 Model Specification

To investigate the dynamic relationship between Deposit Money Bank's financial intermediation and the performance of the Manufacturing Sector in the Nigerian economy, the functional model below was used:

$$Manufacturing\ Output = f\left(Deposit\ Money\ Banks' Financial\ Intermediation\right) \quad (1)$$

Adding the proxies for both the explained and explanatory variables including the intervening variables, the function becomes:

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$$MNOUT = f\ (DMBCMS, DD, LDR, DIR, LIR) \quad (2)$$

Mathematically, the model is presented as:

$$MNOUT = DMBCMS + DD + LDR + DIR + LIR \quad (3)$$

To get the econometric model, the variables were modified by obtaining the natural log forms of the variables and adding the error term as presented in equation 4 below. The variables used were transformed into logarithmic form so as to minimize the scale effect.

$$LMNOUT_t = \beta + \omega LDMCMS_t + \delta LDD_t + \varphi LLDR_t + \pi LDIR_t + \lambda LLIR_t + \varepsilon_t \quad (4)$$

Where:

ω, δ, φ , π and λ are coefficients of their corresponding variables.

LMNOUT= log of manufacturing output

LDMBCMS = log of deposit money banks' credits to the manufacturing r

LDD = log of demand deposits

LLDR = log of loan-to-deposit ratio

LDIR = log of deposit interest rate

LLIR = log of lending interest rate

ε_t is the error term

3.8 Estimation

The ARDL (Auto Regressive Distributed Lagged) model, which is a widely used econometric technique when dealing with variables that are integrated of different orders, I(0), I(1) or a combination of both and, robust when there is a single long run relationship between the underlying variables in a small sample size, was adopted because of the result got from the performed unit root tests.

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Results from both the Augmented Dickey Fuller (ADF) and Phillip Perron (PP) unit-root tests agreed to the different orders of integration I(0) and I(1) of the variables employed in this study.

The ARDL model for estimation is hereby presented below:

$$\Delta LMNOUT = \beta + \sum_{i=1}^{p} \sigma_i \, \Delta LMNOUT_{t-i} + \sum_{i=1}^{q} \omega_i \, \Delta LDMBCMS_{t-I} + \sum_{I=1}^{q} \delta i \, \Delta LDD_{t-1} + \sum_{I=1}^{q} \varphi i \, \Delta LLDR_{t-1} + \sum_{I=1}^{q} \pi i \, \Delta LDIR_{t-1} + \sum_{i=1}^{q} \lambda i \, \Delta LLIR_{t-1} + \alpha_1 LNMNOUT_{t-1} + \alpha_2 LDMBCMS_{t-1} + \alpha_3 LDD_{t-1} + \alpha_4 LLDR_{t-1} \; \alpha_5 LDIR_{t-1} + \alpha_6 \, LLIR_{t-1} + \varepsilon_t \quad (5)$$

Where:

i = 1,…,p, lag periods;

i = 1,…,q, lag periods;

σ, ω, δ, φ , π and λ are short run dynamic coefficients of the models adjustment long run equilibrium.

ε_t is the error term

LMNOUT= log of manufacturing output

LDMBCMS = log of deposit money banks' credits to the manufacturing r

LDD = log of demand deposits

LLDR = log of loan-to-deposit ratio

LDIR = log of deposit interest rate

LLIR = log of lending interest rate

3.9 Post Estimation Tests

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Normality Test: This test is conducted to establish whether or not the estimated model is normally distributed and this is necessary so that the ARDL model would have a good predictive power over the sample period. An important test statistic used for this purpose is the Jarque-Berra test statistic. The hypothesis is stated as

H_0: The series is normally distributed

H_A: The series is not normally distributed

P (value) < 5% reject null i.e. not normally distributed, accept otherwise

Heteroscedasticity Test: This is conducted to evaluate the variance of the error term and check if this variance is constant overtime (i.e. to know if the variance of the error term is homoscedastic or heteroskedastic). It also tries to explain further the independence of the error term with respect to the explanatory variables of the regression model. This test is important to this research work as it is one of the assumptions of the classical linear regression model. For the purpose of this study, Autoregressive Conditional Heteroscedasticity Lagrange Multiplier Test (ARCH LM) will be adopted.

H_0: No heteroscedasticity

H_A: There is heteroscedasticity

P (value) < 5% reject null. However, if, P (value) >5% accept the null.

Serial Correlation Test: Serial correlation is also known as autocorrelation. Autocorrelation is a violation of the Ordinary Least Square assumption of independence of the error term. This is also one of the major assumptions of the classical linear regression model. This test will be used to test for correlation among error terms. It will be necessary to carry out this test to know if the error term in a particular period is independent of the error term in another period. For serial correlation test, Breusch-Pagan-Godfrey test was adopted.

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H_0: No autocorrelation

H_A: There is autocorrelation

P (value) < 5% reject null. However, if, P (value) >5% accept the null.

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Endnotes

1. A. Yeboah, *"An Estimation of the Impact of Financial Intermediation on the Economic Growth of Ghana; With Emphasis on the Private Sector,"* **EJBMR,**

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Chapter Four

Results and Discussion of Findings

This chapter presents results generated by the estimation techniques and the model specified in the previous chapter and afterwards examines critically and analyzes the results empirically.

The results to be presented and analyzed include the descriptive statistics, graphical analyses, unit root tests and co-integration test which all belong to pre-estimation. The chapter also presents the estimation, post-estimation (diagnostics) result and robustness check.

4.1 Preliminary Results

4.1.1 Descriptive Statistics

The descriptive statistics shows the behaviour and distribution of each of the variables employed and informed the method of estimation to be used in this study. Table 4. 1 presents the summary statistics of the model's variables.

Table 4.1: Descriptive Statistics

	MNOUT	DMBCMS	DD	LDR	DIR	LIR
Mean	4.16E+12	6.27E+11	2.06E+12	67.60765	7.162172	17.45375
Median	3.57E+12	1.74E+11	3.97E+11	67.76250	5.042500	17.52751
Maximum	6.68E+12	3.19E+12	1.11E+13	96.81702	18.80000	29.80000
Minimum	2.90E+12	2.66E+09	4.88E+09	37.55947	1.410541	7.750000
Std. Dev.	1.27E+12	8.63E+11	2.82E+12	13.66447	4.989478	4.603263
Skewness	0.919787	1.416118	1.264485	-0.235987	0.884109	0.238232
Kurtosis	2.285898	3.941660	3.796576	2.563696	2.405405	3.619052
Jarque-Bera	6.489956	14.84713	11.71705	0.688536	5.800232	1.017071
Probability	0.038969	0.000597	0.002855	0.708739	0.055017	0.601376
Observations	40	40	40	40	40	40

Source: Author's compilation) 2022

Table 4.1 reveals some of the statistical properties of the selected variables for this study. The variables include Manufacturing Output (MNOUT), Deposit Money Banks' Credit to the Manufacturing Sector (DMBCMS), Demand Deposits (DD), Loan-to-Deposit Ratio (LDR), Deposit Interest Rate (DIR) and Lending Interest Rate (LIR) from years 1981 to 2020.

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From the descriptive statistics, on average, Nigeria recorded ₦4.16 trillion, ₦6.27 billion and ₦2.06 trillion for MNOUT, DMBCMS and DD respectively. LDR, DIR and LIR on the other hand averaged 67.61%, 7.16% and 17.45%. Also, within the range of years considered, the maximum and minimum real contribution of the manufacturing sector to the total real gross domestic product values were ₦6.68 trillion in 2014 and ₦2.90 trillion in 1998. The highest value of DMBCMS was recorded in 2020 as ₦3.19 trillion and ₦2.66 billion in 1981.

In the same vein, ₦11.1 trillion was the maximum DD in 2020 while the lowest value of ₦4.88 billion was recorded in 1981. Also, LDR reached its peak of 98.82% in 2006 and its lowest value of 37.56% was recorded in 2013. DIR recorded its highest value of 18.8% in 1990 with 1.41% being its lowest in 2011. Lastly, the maximum value for LIR was 29.80% in 1992 while its lowest value was 7.75% in 1981.

In assessing the extent to which the observations are clustered or dispersed around their respective means, the standard deviation to mean ratios was considered. The higher the standard deviation, the more widely dispersed the distribution. DD appears to be most dispersed around its mean value than the remaining five variables. Skewness measures the asymmetry of the distribution of the series around its mean. A positive skewness means that the distribution has a long right tail and negative skewness implies that the distribution has a long left tail. The skewness of a normal distribution is zero. All the variables are positively skewed except for LDR. Kurtosis measures the peakness or flatness of the distribution of the series. For normal distribution, the kurtosis is 3, (mesokurtic), but if it exceeds this value, the distribution is assumed to be peaked (leptokurtic) relative to the normal, but if it is less than 3, the distribution is flat (platykurtic) relative to the normal. DMBCMS, DD and LIR are leptokurtic, while the remaining variables are platykurtic.

4.1.2 Trend Analysis

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Trend analysis is a graphical presentation of variables to show the growth, downturn and upward changes of a particular variable within the years under consideration. Likewise, it provides a qualitative assessment of possible relationship among series. The figures below show the graphical expressions of each of the variables.

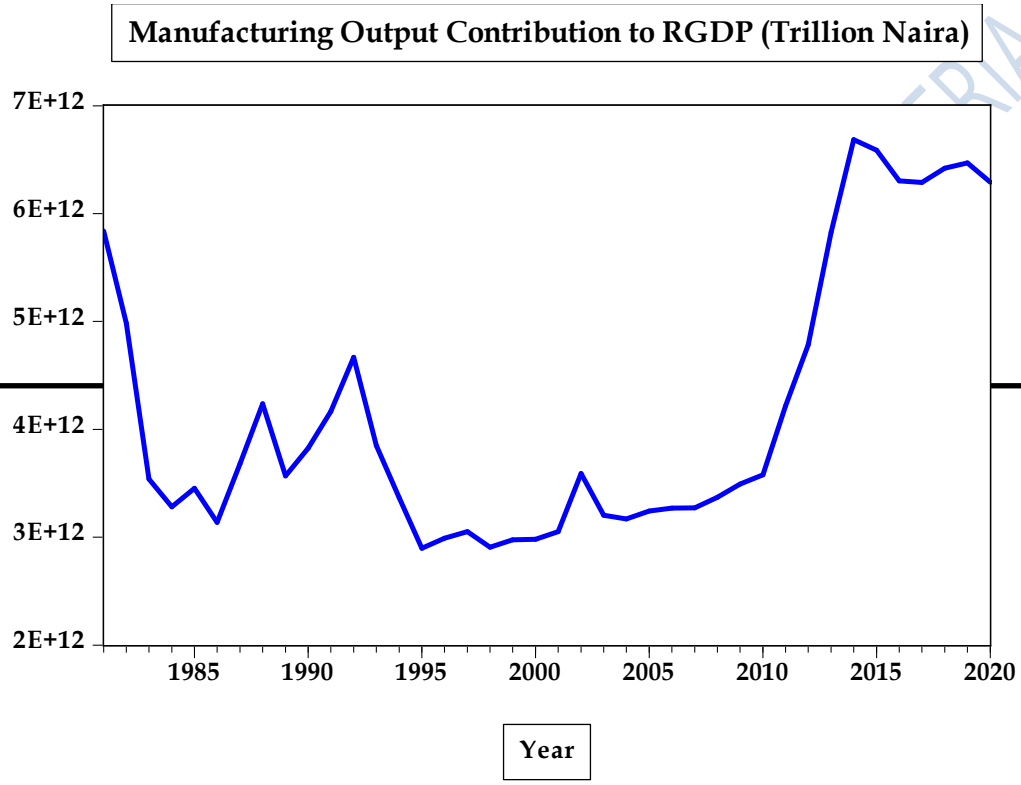

Figure 4.1: Trend of Manufacturing Output Contribution to Real Gross Domestic Product (Trillion Naira) Source: Author's compilation (2022)

Figure 4.1 shows the trend of manufacturing output contribution to Real Gross Domestic Product in Nigeria over the years under consideration. A quick glance at the trend reveals two different sides of the graph; a downtrend, an uptrend with ranging fluctuations in between. An encouraging value of ₦5.84 trillion was followed by heartbreaking decline with little booms intermittently which was followed by more declines that led to the lowest recorded value of ₦2.90 trillion in 1998.

However, the sector's performance got better year after year and maintained a relatively upward increase till 2014, recording ₦6.68 trillion, which was the highest value so far. This was welcomed by little dips in the years after, though still on the high side.

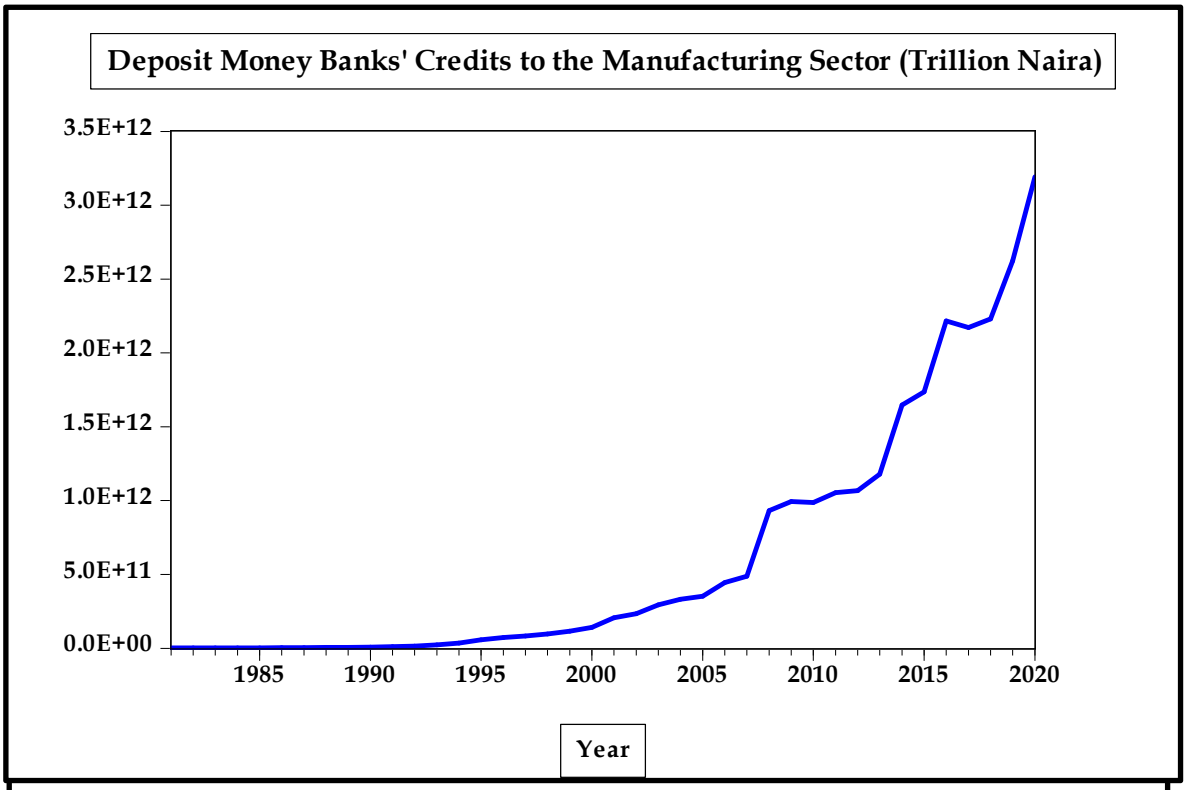

Figure 4.2: Trend of Deposit Money Banks' Credits to the Manufacturing Sector (Trillion Naira) Source: Author's compilation (2022)

Figure 4.2 shows the trend of credits made available by Deposit Money Banks in Nigeria to the Manufacturing sector over the years under consideration. It can be seen that the value of DMBCMS was not encouraging until around 1994. The lowest value of ₦2.66 billion was recorded in 1981 which is relatively not visible on the graph. ₦34.8 billion was injected into the manufacturing sector in 1994, which revealed a visible upward movement on the graph.

DMBCMS has been on the increase ever since then, though experienced some fluctuations as it recorded its highest value of ₦3.01 trillion in 2020.

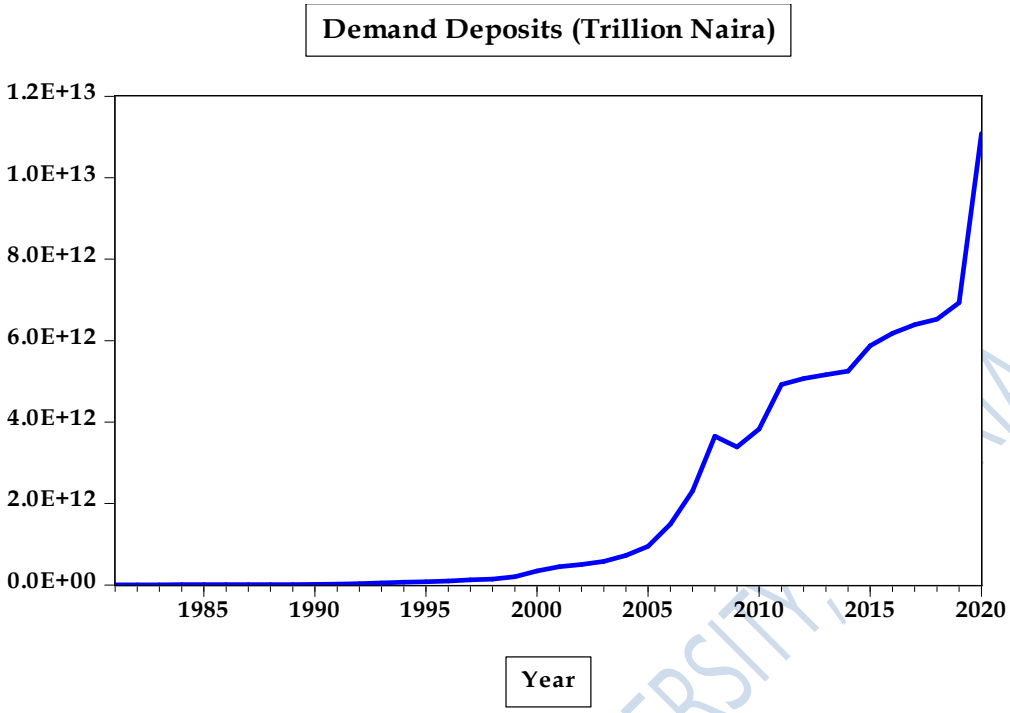

Figure 4.3: Trend of Demand Deposits of Deposit Money Banks (Trillion Naira) Source: Author's compilation (2022)

From figure 4.3, demand deposits did not start a significant rise in trend until around 1996 where it recorded ₦95.9 billion which is way higher than its lowest value of ₦4.88 billion in 1981. It kept up with this impulsive move with little fluctuations in between till its highest value of ₦11.1 trillion in 2020.

On overall, the graph shows that DD in Nigeria has been increasing over time.

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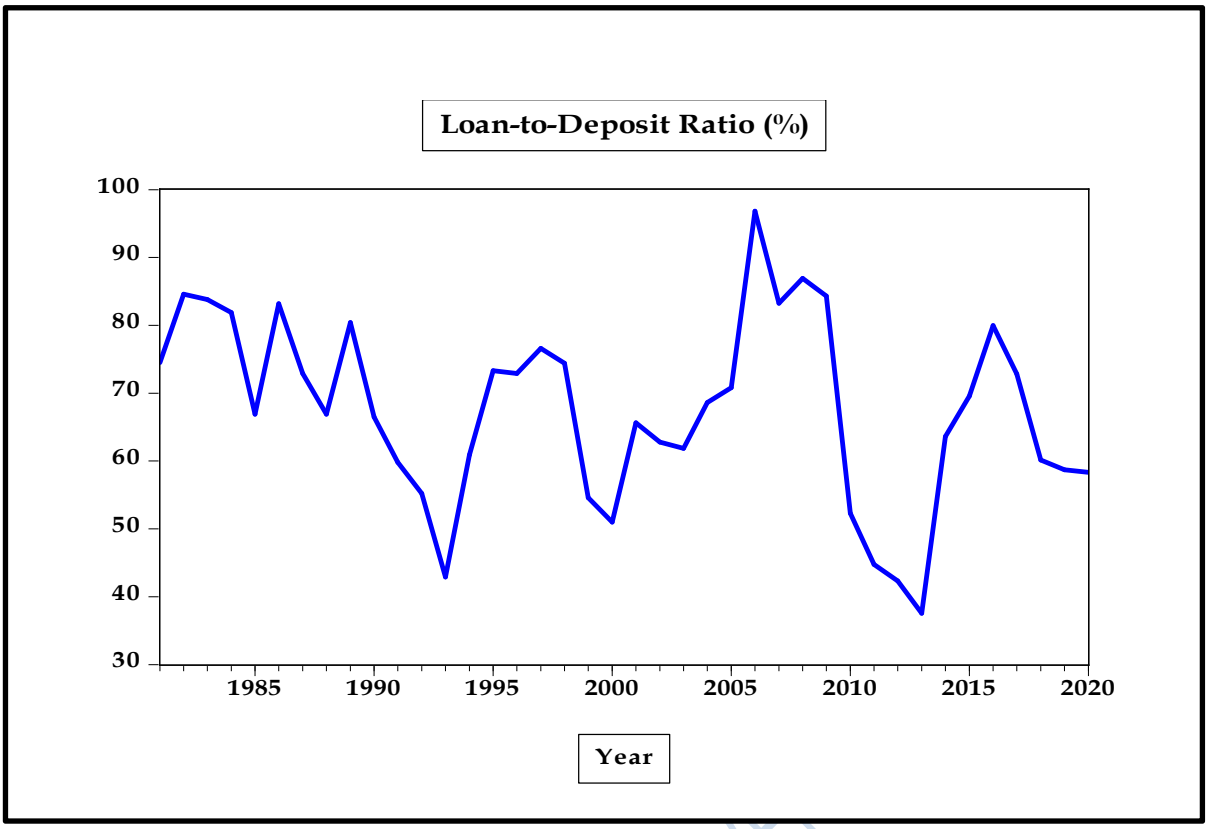

Figure 4.4: Trend of Loan-to-Deposit Ratio of Deposit Money Banks (%) Source: Author's compilation (2022)

Loan-to-Deposit ratio, as seen from figure 4.4 is without a definite movement with rise and fall of values across the years under consideration could be seen. The trend formed higher highs and lower lows with fluctuations in between.

The trend depicted a downward trend when it resumed its fall in 1982 with a value of 84.6% till 42.9% in 1993. It took a sharp rise the following year and maintained a relative increase in value, which led to a grand breaking value of 96.81% in 2006. This marked the highest recorded value. Unfortunately, LDR dropped in 2007 and recorded its lowest value of 37.56 in 2013.

The trend has therefore been in a ranging form with considerable support and resistant zones.

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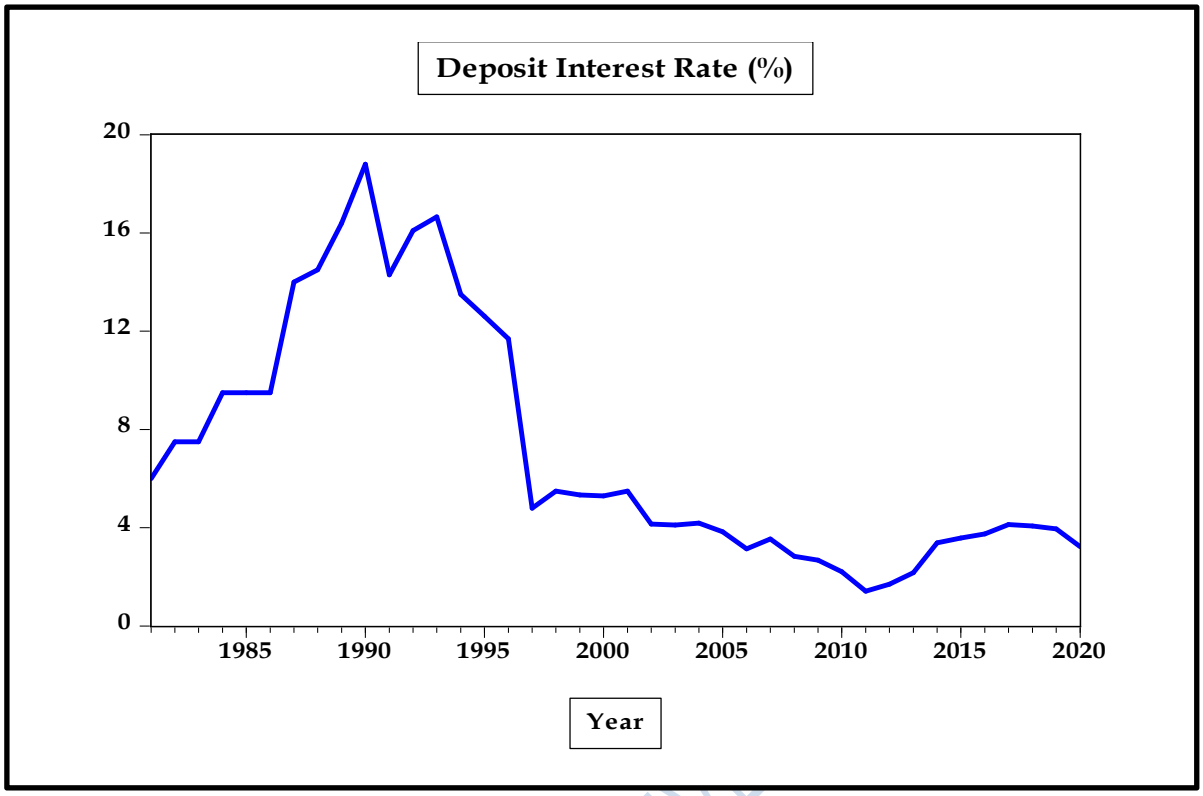

Figure 4.5: Trend of Deposit Interest Rate of Deposit Money Banks (%) Source: Author's compilation (2022)

Deposit interest rate as depicted in figure 4.5 above experienced an erratic movement in its trend in the years under consideration. It is as though the series are in two parts, with uptrend at the first part till it got to its peak in 1990 with 18.8% and then the downtrend followed recording its lowest value of 1.41% in 2011. Both the up and down trends had fluctuations and pull backs in between.

It can be concluded that DIR has not been encouraging to depositors as its downward trend has relatively been constant after its sharp fall of 16.1% in 1993 to 4.80% in 1997.

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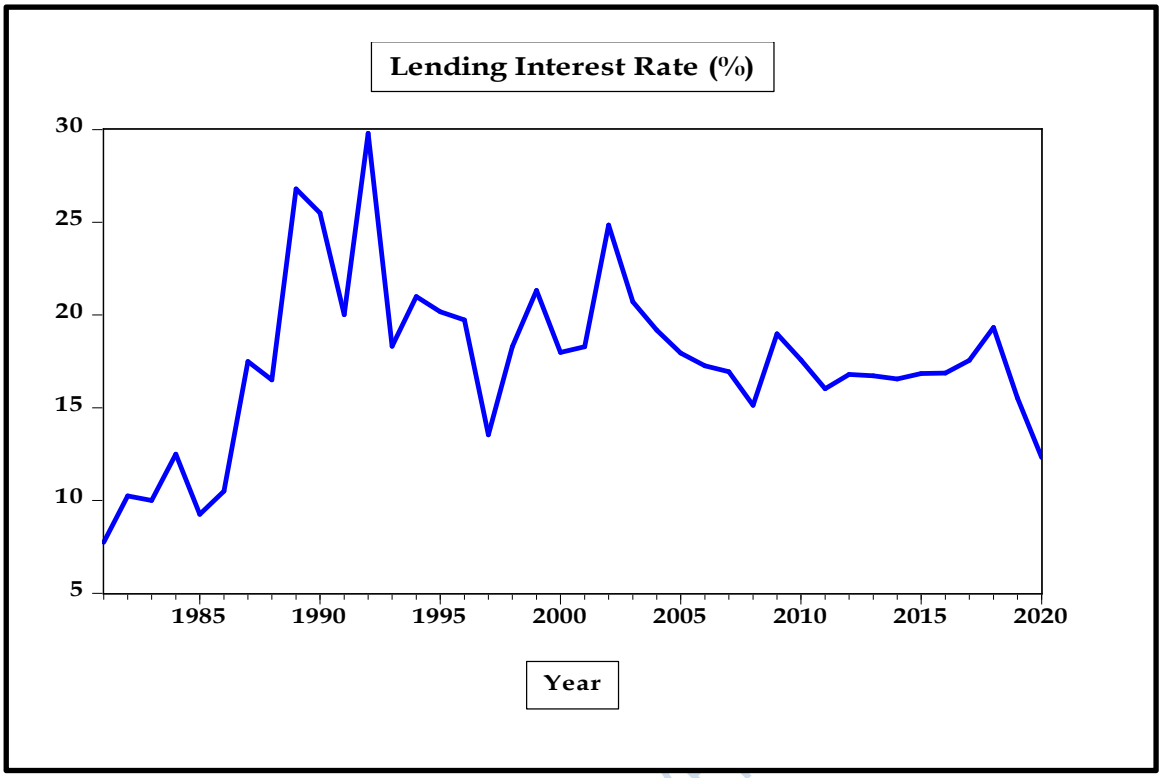

Figure 4.6: Trend of Lending Interest Rate of Deposit Money Banks (%) Source: Author's compilation (2022)

Lending rate from figure 4.6 had lopsided trend with asymmetrical movements across the years under consideration. Just as observed with deposit interest rate, lending interest rate also spiked during the early years considered reaching its peak at 29.80% in 1992. This was followed by a sharp fall with intermittent pull backs but has been on a downward trend ever since then but not yet reached its lowest value of 7.75% recorded in 1981.

4.1.3 Unit Root Tests

As a precondition for dealing with time series data, the issue of stationarity becomes imperative. It is obligatory that series must exhibit stationarity so as to not yield spurious and misleading results. Unit root test is a common test in econometric analysis to check whether a series is time invariant i.e. whether its properties of mean, variance and auto covariance are constant over time.

If these properties are time variant, the series is said to be non – stationary thus follow a unit root process. Otherwise, stationary and does not follow a unit root process. Hence, this study

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subjects each of the series in our model to various unit root tests. The null hypothesis of Augmented Dickey Fuller test and Philip – Perron test used in this study states that the series contain unit root but with variants in their alternative hypothesis. The results are presented in Table 4.2 and 4.3.

Table 4.2 – Augmented Dickey – Fuller (ADF) Test

Variables	Level			First Difference			I (d)
	Model I	Model II	Model III	Model I	Model II	Model III	
LMNOUT	-1.353406	-2.405462	0.292535	-4.610495***	-4.795377***	-4.662063***	I (1)
LDMBCMS	-0.873167	-0.736201	7.190732	-4.960645***	-4.982992***	-1.435021	I (1)
LDD	-0.615886	-1.640514	2.228795	-3.978358***	-3.947635**	-2.000538**	I (1)
LLDR	-4.638342***	-4.970576***	-0.343701	----------	---------	----------	I (0)
LDIR	-0.851359	-2.149659	-0.717313	-5.764666***	-5.701946***	-5.796578***	I (1)
LLIR	-3.481520***	-3.108988*	0.202138	----------	---------	----------	I (0)

****, **, *** represent significance levels at 10%, 5%, and 1% respectively. a and b represent the order of integration i.e. I (0) and I (1), respectively. Model I, II, and III are unit root with intercept, intercept and trend, and without intercept and trend respectively. Source: Author's compilation 2022.***

Table 4.3 – Phillip – Perron (PP) Test

Variables	Level			First Difference			I (d)
	Model I	Model II	Model III	Model I	Model II	Model III	
LMNOUT	-1.485072	-2.518701	0.076910	-4.610495***	-4.765463***	-4.662063***	I (1)
LDMBCMS	-0.810661	-1.074699	5.744059	-4.938064	-4.982992***	-4.982992	I (1)
LDD	-0.579026	-1.335085	3.294373	-3.969804***	-3.935998**	-1.686092	I (1)
LLDR	-2.915502**	-3.030514*	-0.344162	----------	---------	----------	I (0)
LDIR	-1.015649	-2.310623	-0.725777	-5.797831***	-5.742010***	-5.834020***	I (1)
LLIR	-3.440834**	-2.990599*	0.162291	----------	---------	----------	I (0)

****, **, *** represent significance levels at 10%, 5%, and 1% respectively. a and b represent the order of integration i.e. I (0) and I (1), respectively. Model I, II, and III are unit root with intercept, intercept and trend, and without intercept and trend respectively. Source: Author's compilation 2022.***

Table 4.2 and 4.3 present the ADF and PP unit root tests results. From the ADF results, all variables are not stationary at level except log of Loan-to-Deposit Ratio and Lending Interest Rate, considering all test options (Constant – Model I, Constant and trend – Model II, without constant and trend – Model III). Log of Loan-to-Deposit Ratio and Lending Interest Rate series are stationary in their level forms at different significant levels as indicated with the asterisks. In other words, the log series of Manufacturing Output, Deposit Money Banks'

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Credit to the Manufacturing Sector, Demand Deposits and Deposit Interest Rate were differenced once before expelling unit root in their properties.

The last column titled "I (d)" in table 4.2 and 4.3 concludes on the order of integration of the variables. It is worthy of note that the PP test result in Table 4.3 conforms to the ADF unit root test result in Table 4.2.

Conclusively, all variables are integrated of one (I (1)) except the log series of loan-to-deposit ratio and lending interest rate which are integrated of order zero (I (0)).

4.1.4 Cointegration Test

Cointegration test is used to detect or check for the presence of long-run equilibrium between series. Since it has been established that some variables are not stationary at level evident from the unit root tests above, there is need to check whether there is existence of similar trend properties between the series as a model on co-integrated series is said to be super consistent. Thus, given the model and order of integration of the variables, the most appropriate cointegration test is the Autoregressive Distributed Lags (ARDL) bounds test. The ARDL bounds test allows for the combination of variables with different orders of integration. The ARDL bounds test result is provided in Table 4.4:

Table 4.4 ARDL Bounds Test

Test Statistic				
F-Statistic		2.829206		
Critical Value Bounds				
Significance	10%	5%	2.5%	1%
I(0)	2.26	2.62	2.96	3.41
I(1)	3.35	3.79	4.18	4.18

Table 4.4 ARDL Bounds Test. Source: Author's compilation 2022

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Using the ARDL bounds test, the result above showed that the value of the test-statistic of 2.82 is higher than the lower bound values at both 10% and 5% significant level with corresponding values of 2.26 and 2.62.

Based on a 5% significant level, it can be concluded that there is cointegration among the series. This agrees with findings of [1], [2], [3], [4] and [5] but negates the findings of [6].

4.2 Estimation

4.2.1 Model Estimation Results

The previous sub-sections have revealed that there is unit root at different levels in the individual series and also that there is co-integration among the variables. Following the different orders: I (0) and I (1), the Auto Regressive Distributed Lagged (ARDL) model is employed for both short run (dynamic) and long run (static) relationships. In the ARDL model, an error correction mechanism exists by which changes in the dependent variables are modeled as a function of the level of the disequilibrium in the cointegrating relationship, captured by the error-correction term (ECT), as well as changes in the other explanatory variables to capture all short-term relations among variables.

The ARDL model for estimation is:

$$\Delta LMNOUT = \beta + \sum_{i=1}^{p} \sigma_i \, \Delta LMNOUT_{t-i} + \sum_{i=1}^{q} \omega_i \, \Delta LDMBCMS_{t-I} + \sum_{I=1}^{q} \delta i \, \Delta LDD_{t-1} + \sum_{I=1}^{q} \varphi i \, \Delta LLDR_{t-1} + \sum_{I=1}^{q} \pi i \, \Delta LDIR_{t-1} + \sum_{i=1}^{q} \lambda i \, \Delta LLIR_{t-1} + \alpha_1 LNMNOUT_{t-1} + \alpha_2 LDMBCMS_{t-1} + \alpha_3 LDD_{t-1} + \alpha_4 LLDR_{t-1} \; \alpha_5 LDIR_{t-1} + \alpha_6 \, LLIR_{t-1} + \varepsilon_t \quad (5)$$

Where:

i = 1,…,p, lag periods;

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i = 1,…,q, lag periods;

σ, ω, δ, φ , π and λ are short run dynamic coefficients of the models adjustment long run equilibrium.

ε_t is the error term

LMNOUT= log of manufacturing output

LDMBCMS = log of deposit money banks' credits to the manufacturing sector

LDD = log of demand deposits

LLDR = log of loan-to-deposit ratio

LDIR = log of deposit interest rate

LLIR = log of lending interest rate

4.2.2 Short run ARDL Estimate (Error Correction Model)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDMBCMS)	-0.171294	0.085520	-2.002967	0.0549
D(LDD)	0.165927	0.124895	1.361235	0.1843
D(LDD(-1))	-0.251200	0.116058	-2.164440	0.0391
D(LLDR)	-0.163030	0.088166	-1.849136	0.0750
D(LDIR)	0.134741	0.084895	1.587135	0.1237
D(LLIR)	0.090031	0.096831	0.929774	0.3604
CointEq(-1)	-0.310763	0.109541	-2.836965	0.0084

Cointeq = LMOUT - (-0.5512*LDMCMS + 0.6725*LDD -0.5246*LLDR + 0.4336 *LDIR -0.4216*LLIR +41.3255)

Table 4.5: Short run ARDL Estimate. Source: Author's compilation 2022

4.2.3 Long run ARDL Estimate

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS	-0.551203	0.269751	-2.043379	0.0505
LDD	0.672534	0.252260	2.666029	0.0126
LLDR	-0.524612	0.312792	-1.677188	0.1046
LDIR	0.433579	0.185816	2.333381	0.0270
LLIR	-0.421570	0.200281	-2.104890	0.0570
C	41.325484	5.200680	7.946170	0.0000

Table 4.6: Long run ARDL Estimate. Source: Author's compilation 2022

4.3. Test of Hypotheses

This study sought out to test five hypotheses. The results from the methodology as presented in the estimation section will be used to test them one after the other as spelt out under the hypotheses section.

The hypotheses of this study are stated in the null, they are as follows:

H_O1: Credit allocated to the manufacturing sector does not have a significant impact on the performance of the sector in Nigeria.

The result from the ARDL model showed that DMBCMS has a negative significant impact on the performance of the manufacturing sector both in the short and long run at 10% significant level.

H_O2: Demand Deposit does not significantly influence the performance of the manufacturing sector in Nigeria.

The result revealed that DD of Deposit Money Banks does not significantly influence the performance of the manufacturing sector in Nigeria in the short-run. Although, the DD of the previous year is significant on the performance of the manufacturing sector in the

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current year at 5%. In the long-run, DD has a positive significant influence on the performance of the manufacturing sector in Nigeria at 5%.

H_O3: Loan-to-Deposit ratio does not significantly stimulate the performance of the manufacturing sector in Nigeria.

The result revealed that loan-to-deposit ratio negatively stimulates the performance of the manufacturing sector in the short-run at 10%. In the long run, it is insignificant in stimulating the performance of the manufacturing sector in Nigeria.

H_O4: Deposit interest rate does not have significant effect on the performance of the manufacturing sector in Nigeria.

The result revealed that DIR does not significantly have an effect on the performance of the manufacturing sector in Nigeria in the short-run. However, in the long-run, this is not the case as DIR positively and significantly has an effect on the performance of the manufacturing sector in Nigeria at 5%.

H_O5: Lending interest rate does not have a significant impact on the performance of the manufacturing sector in Nigeria.

The result revealed that lending interest rate does not significantly have an impact on the performance of the manufacturing sector in Nigeria in the short-run. This is not the case, as it has a negative significant impact on the performance of the manufacturing sector in the long-run.

Table 4.7: ARDL Error Correction Results

Dependent Variable: LMOUT

Variable	Coefficient	Std. Error	t-Statistic	Prob.

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D(LDMBCMS)	-0.171294	0.085520	-2.002967	0.0549
D(LDD)	0.165927	0.124895	1.361235	0.1843
D(LDD(-1))	-0.251200	0.116058	-2.164440	0.0391
D(LLDR)	-0.163030	0.088166	-1.849136	0.0750
D(LDIR)	0.134741	0.084895	1.587135	0.1237
D(LLIR)	0.090031	0.096831	0.929774	0.3604
CointEq(-1)	-0.310763	0.109541	-2.836965	0.0084

Cointeq = LMOUT - (-0.5512*LDMCMS + 0.6725*LDD -0.5246*LLDR + 0.4336 *LDIR -0.4216*LLIR +41.3255)

R-squared	0.914884	Mean dependent var	29.00063
Adjusted R-squared	0.887526	S.D. dependent var	0.278892
S.E. of regression	0.093533	Akaike info criterion	-1.680078
Sum squared resid	0.244954	Schwarz criterion	-1.249134
Log likelihood	41.92148	Hannan-Quinn criter.	-1.526751
F-statistic	33.44045	Durbin-Watson stat	1.724064
Prob(F-statistic)	0.000000		

Source: Author's compilation 2022

From the short run ARDL estimate results for the model presented in Table 4.7, it reveals that the error correction term (ECT), which is negative, less than 1 is significant at both 1% and 5%. Its coefficient of -0.310763 indicates the adjustment speed of the variables to the long-run equilibrium of 31.1%. The result simply means that 31.1% of the disequilibrium in the previous period is corrected in the present period (year).

The results further indicated that Deposit Money Banks' Credits to the manufacturing Sector has a negative effect on the output performance of manufacturing sector, even in the short-run, though significant at 10%. This could be attributed to the negative effect of Lending Interest

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Rate as revealed in the long-run equation. This further reiterates the fact that higher lending interest rate is detrimental to the growth of the manufacturing sector and the economy as a whole as reported in the works of past authors earlier mentioned whose studies were holistic in nature, considering the whole Nigeria as a whole. This implies that a percentage change in DMBCMS will lead to a negative percentage change of 0.17 in manufacturing sector's output in the short run.

The result further revealed that last year's Demand Deposits, D (LDD (-1)) has a negative significant effect on the output of the manufacturing sector of this year which is significant at 5%. This could be due to different reasons, one of which could be inflation which affects economic growth and stability, which could discourage savings as citizens have to pay more to buy goods and services. Small ratio for savings is therefore removed from their income. Also, taxes, most especially, the Value added Tax, has been on the upside, which leads to a reduction in the disposable income of the citizens. Therefore, a percentage change in demand deposit of last year will lead to a negative 0.25% fall in the output of the manufacturing sector in the short run. Loan-to-Deposit Ratio (LLDR) has a negative effect on LMOUT in the short-run at 10% significant level, which implies that there will be a fall in manufacturing output by 0.16% by a unit change of LDR.

Deposit and Lending Interest Rates both have positive effect on the performance of the manufacturing sector in the short run, though insignificantly.

The R-squared depicts that 91.5% of the variations in the dependent variable are accounted for by the independent variables in the model. The F-statistic has a probability of 0.000 which is lower than 0.01 (1% level), signalling that the model is significant and reliable for economic findings. Durbin-Watson statistic of 1.72 is lower than the threshold of 2.0 affirming the absence of autocorrelation.

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4.4 Residual Diagnostic Tests

4.4.1 Normality Test

The Jarque-Bera normality test is conducted to check whether the residuals (error term) of the estimated random effect model comes from a population that is normally distributed. The null hypothesis is that residual is normally distributed as against the alternative hypothesis that residual is not normally distributed.

Table 4.8: Jarque-Bera Normality Test

Normality Test:			
Jarque-Bera	0.210739	Prob.	0.899992

Source: Author's compilation 2022

With probability value exceeding the 5% critical level, the null hypothesis of normality is accepted. Hence the model has normally distributed residuals, a desirable linear regression property.

4.4.2 Serial Correlation LM Test

It is important to check the validity and reliability of the model. The commonest and most relevant post estimation test for multivariate models is the Breusch-Godfrey Serial correlation LM test.

Serial correlation is a violation of the independent distribution of the error term over time in time series data. The presence of serial correlation can meaningfully alter the result and reliability of the model in determining causality and forecasting.

Table 4.9 Residual Serial LM Diagnostics Test

Serial Correlation LM Test: Breusch-Godfrey			
F-statistic	0.379388	Prob. F(1,27)	0.5431

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Obs*R-squared	0.526554	Prob. Chi-Square(1)	0.4681

Source: Author's compilation 2022

The null hypothesis for the LM test is that there is no serial correlation. The result presented in Table 4.9 suggests that there is no presence of serial correlation in the model.

4.4.3 Heteroskedasticity Test

In a bit to test the efficiency of the estimator used in this study, the ARCH homoskedasticity test was conducted on the residuals of the ARDL estimates. The results were depicted in Table 4.10 below.

Table 4.10: Heteroskedasticity Test: ARCH

Heteroskedasticity Test: ARCH			
F-statistic	0.086315	Prob. F(1,35)	0.7707
Obs*R-squared	0.091023	Prob. Chi-Square(1)	0.7629

Source: Author's compilation 2022

Also, the null hypothesis for this test is that the residuals are homoskedastic, and from table 4.11, the F-statistic p-value of 0.7707 is greater than critical values of 0.01 and 0.05, it showed that null hypothesis was accepted at both 1% and 5% significance levels. It was therefore, concluded that the residuals are homoskedastic and the estimation is efficient.

4.5 Discussion of Findings

Major findings from the estimation are discussed below. These contain both the short-run and long-run estimates giving a broad look to other important values like the F-statistics, ECT, etc. This is comprehensively displayed below:

Table 4.6: ARDL Long-run Coefficients for Model

Dependent Variable: LMOUT

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS	-0.551203	0.269751	-2.043379	0.0505
LDD	0.672534	0.252260	2.666029	0.0126
LLDR	-0.524612	0.312792	-1.677188	0.1046
LDIR	0.433579	0.185816	2.333381	0.0270
LLIR	-0.421570	0.200281	-2.104890	0.0570
C	41.325484	5.200680	7.946170	0.0000

Source: Author's compilation 2022

The long-run coefficients presented in Table 4.6 shows that Deposit Money Banks' Credit to the Manufacturing Sector (LDMBSMS) has a negative significant long-run effect on the output potential of the manufacturing sector towards the total Real Gross Domestic Product (RGDP) of Nigeria. This is significant at 10%. This is consistent with the findings of [2], [3], [6] and [7] but negates the findings of [1], [8], [5] and [9] using data from Nigeria by the first two sets of authors and the later, Malawi respectively. It is worthy of note that the authors above used a general variable, Credit to Private Sector (CPS) since their studies are not sectoral unlike this study. What are the factors that could have led to this long run negative significant effect?

First, according to the proponents of the supply-leading hypothesis of the finance-economic growth nexus, credit to the private sector is expected to help boost economic growth when such credits are efficiently applied for innovative projects or investments. The private sector, in this case, the manufacturing sector, is often believed to be the source of innovative ideas and new inventions that require financing to produce the anticipated positive impact on the entire economy. It is therefore theoretically. However, if credit to the private sector is applied by private entrepreneurs and their firms for commercial importation of goods from abroad to be sold in the local economy, the result of private sector financing could be distressing to the economy[10]. In furtherance, it was observed that private sector credit could not sufficiently

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affect the Nigerian economy as a chunk of private sector credit gets into the hands of importers of foreign goods for sale in the domestic markets which makes bank credit rarely get to real inventors whose activities positively and significantly affect economic growth. The second reason could be attributed to the high interest rate as observed in Ghana which is also evident in Nigeria from the negative significant effect of lending interest rate in this study[11].

Demand Deposits (LDD) has a positive long-run significant impact on the performance of the manufacturing sector. This is evident from the significant value of its probability at 5%. This is expected, as deposit money banks depend largely on deposits entrusted in their care by savers, who in turn are paid deposit interest rates, to cater for loan requests from the deficit side of the economy. A proper use of the credits got from banks, ceteris paribus, will lead to a boost in the performance of the manufacturing sector. On the other hand, Loan-to-Deposit Ratio (LLDR) has a negative relationship with the output performance of the manufacturing sector. This was although insignificant.

A further check shows Deposit Interest Rate, LDIR and Lending Interest Rate, LLIR have long-run relationships with the performance of the manufacturing sector. This is justified by the significance of their coefficients at 5% and 10% levels respectively. While deposit interest rate has a positive long-run effect, lending interest rate is negative. This is theoretical as an increase in savings from the surplus side of the economy, which can be influenced through increase in deposit interest rate, empowers financial intermediaries to create more credits that can propel the increase in the output of the manufacturing sector thereby leading to the overall economic growth.

Unfortunately, increase in lending interest rate is detrimental to economic growth since it discourages investors as revealed in the empirical result of this study. The result is in line with the findings of [6], [12] and [13] who found a negative effect of lending rate on economic growth.

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This is contrary to the findings of [14] who found that interest rate has a significant positive effect on economic growth in Nigeria.

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Chapter Five

Conclusion

This chapter ends the thesis with sub-sections which include the summary of major findings, which at a glance, provides an outline of the whole thesis. Conclusion to the study follows after. Recommendations from this study is also a sub-section in his chapter, where recommendations are outlined for policy makers and interested stakeholders for decision making. Contribution to knowledge, limitation of the study and suggestion for further research end this chapter.

5.1 Summary of Major Findings

The broad objective of this study was to investigate the varying dynamic relationship between Deposit Money Banks' financial intermediation and the performance of the manufacturing sector in Nigeria both in the short-run and long-run, factoring in cost of borrowing (lending rate) and deposit interest rate in Nigeria.

In order to achieve this objective, the study further aimed at some specific objectives which included determining the short-run dynamics and long-run relationship among variables, using Deposit Money Banks' Credits to the Manufacturing Sector (DMBCMS), Demand Deposits (DD), Loan-to-Deposit Ratio (LDR), factoring in Deposit Interest Rate (DIR) and Lending Interest Rate (LIR) as intervening variables on Manufacturing Sector's Output (MNOUT) as the endogenous variable using annual data spanning from 1981 – 2020 sourced from statements of accounts of commercial banks and statistical bulletins from the Central Bank of Nigeria (CBN).

The preliminary analysis included descriptive statistics, graphical illustration and analysis of the variables as well as formal pre-tests i.e. unit root and cointegration test. The unit root test was done via Augmented Dickey Fuller test and Philip Perron test unit root tests. The results for both method of unit root test showed that the variables were of mixed order of integration, I(0) and I(1). The study further adopted the Autoregressive Distributed Lag

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(ARDL) Bounds cointegration test since the variables were fractionally integrated and the result showed that there was long run relationship between the variables as informed from the F-Statistics value of the ARDL Bounds Test.

Both the short-run estimate from the Error Correction Model (ECM) and the long-run estimates using the ARDL model revealed that the error correction term (ECT) was negative, less than one and significant at 1%. Its coefficient of -0.310763 indicated the adjustment speed of the variables to the long-run equilibrium of 31.1%. The result simply meant that 31.1% of the disequilibrium in the previous period is corrected in the present period (year). The R-squared depicts that 91% of the variations in the dependent variable are accounted for by the independent variables in the model. Durbin-Watson statistic of 1.72 is lower than the threshold of 2.0 affirming the absence of autocorrelation. The F-statistic value has a probability of 0.000000 which is lower than 0.01 (1% level), signaling that the model is significant and reliable for economic findings. Durbin-Watson statistic of 1.72 is lower than the threshold of 2.0 affirming the absence of autocorrelation.

There were mixed positive and negative results in both the short and long-run results, with Deposit Money Banks' Credit to the Manufacturing Sector having a negative effect on the output of the Manufacturing Sector both in the short and long-run. Demand Deposit of Deposit Money Banks does not significantly influence the performance of the manufacturing sector in Nigeria in the short-run. Although, the DD of the previous year is significant on the performance of the manufacturing sector in the current year at 5%. In the long-run, DD has a positive significant influence on the performance of the manufacturing sector in Nigeria also at 5%. Loan-to-Deposit Ratio is significant only in the short run. This was also the case for Deposit and Lending Interest Rates, which were only significant in the long run, with the former having a positive impact on the performance of the manufacturing sector, while the

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latter exhibiting a negative effect as high lending interest rate is detrimental not just to the growth of the manufacturing sector, but to economic growth as a whole, as investors are discouraged to get credits.

Residual diagnostic tests, like the Jarque-Bera normality, Breusch-Godfrey serial correlation LM and ARCH homoscedasticity tests were carried out to ascertain the normal distribution of the residuals, validity and reliability of the model, with results which all turned out efficient for forecasting. The null hypothesis of no serial correlation was not rejected based on the p-values got from the residual serial LM diagnostics test. In a bit to test the efficiency of the estimator used in this study, the ARCH homoskedasticity test was also conducted on the residuals of the ARDL estimates, which affirmed that the residuals were homoskedastic and the estimation was efficient.

5.2 Conclusion of the Study

Countries do not just aspire to achieve economic growth but preferably, economic development which is a major difference between the developed, developing and under developed countries. To achieve economic growth and development, adequate financing with the use of financial resources must flow from one part of the economy to the other as economic agents and individuals require finance to serve different purposes.

From the summary above, the financial intermediation indicators used in the study have significant impacts on economic growth, however, it was found out that some of these indicators have insignificant effect and unexpected relationship with economic growth, indicating that the banking intermediation role has not been completely explored on the Nigerian economy. Reasons of this could include misuse of credits by investors on importation rather than domestic production and investment, high level of inflation and

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challenges in implementing policies that may enhance the smooth flow of financial intermediation to achieve the desired results.

Conclusively, from the empirical analysis of this study, financial intermediation of Deposit Money Banks has a significant impact on the growth and performance of the manufacturing sector in Nigeria.

5.3 Recommendations

The importance and significance of financial intermediation cannot be overemphasized as it is instrumental to economic development if well managed. Therefore, from the empirical analysis and conclusion above, the following recommendations are made:

i. The monetary authorities should make policies to compel deposit money banks to lower their lending rates to encourage investors to get credits, as high lending rates is detrimental to the manufacturing sector of the economy and a barrier towards better performance.
ii. More access to credits should be granted to the manufacturing sector of the economy to boost economic development and strict regulations to encourage domestic productions by investors who get the loans, which will boost economic growth rather than importations.
iii. Lastly, friendly and conducive policy framework should be put in place to make deposit interest rate be more compelling to encourage savings.

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5.4 Contribution to Knowledge

This study contributes to knowledge in the following ways. First, aside that it serves as the latest study on the subject matter of financial intermediation, it fills the gap in literature as it

is a sectorial study, picking the manufacturing sector of the country as a point of interest based on the epileptic contribution of the sector in terms of real production of goods and machineries in the country to help reduce the over dependence on imported products as against other reviewed studies that focused on economic growth of the country as a whole with only one focusing on the Agricultural sector.

Secondly, since financial intermediation involves getting financial resources from the surplus side of the economy to the deficit side of the economy, including both deposit interest rate and lending interest rates as intervening variables was seen as important. Past reviewed studies only included either of the interest rates but not both. This study included both interest rates to achieve robust empirical findings.

Lastly, this study advances existing literatures and serves as a guide for other researchers who could be interested in the subject matter and also good for policy making by policy makers as the empirical results from the used methodologies are appropriate, valid and reliable.

5.5 Suggestion for Future Research

This study did not account for inflation in the model. Further study can include inflation as only few studies have included it in their analysis. Inclusion of inflation into the model still fits in into the postulations of the endogenous growth model theory since it is not exogenously determined. Further studies could also use quarterly data if available to capture in-depth changes of the variables used. Further studies could also carry out a sectorial analysis, picking other unresarched sectors.

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Appendix

1. Final Dataset used for Analysis

YEAR	LMNOUT	LDMBCMS	LDD	LLDR	LDIR	LLIR
1981	29.39556	21.70	22.31	4.31	1.79	2.05
1982	29.23741	21.83433357	22.37	4.437934	2.014903	2.327278

1983	28.8945	21.8394233	22.49	4.428433	2.014903	2.302585
1984	28.81963	21.84933115	22.57	4.405499	2.251292	2.525729
1985	28.87047	21.89642886	22.68	4.203199	2.251292	2.224624
1986	28.77445	22.22181688	22.62	4.421247	2.251292	2.351375
1987	28.93413	22.32491348	22.80	4.289089	2.639057	2.862201
1988	29.07506	22.52794153	23.09	4.203199	2.674149	2.80336
1989	28.90322	22.62114054	23.04	4.387014	2.797281	3.288402
1990	28.97274	22.78806317	23.47	4.197202	2.933857	3.238678
1991	29.05783	23.11306479	23.82	4.091006	2.65956	2.996232
1992	29.1717	23.45788656	24.23	4.010963	2.778819	3.394508
1993	28.9792	23.86355722	24.63	3.758872	2.813011	2.907993
1994	28.84432	24.27354967	24.90	4.109233	2.60269	3.044522
1995	28.69521	24.78527142	25.10	4.294561	2.53449	3.004692
1996	28.72652	25.00323344	25.29	4.289089	2.458734	2.982394
1997	28.74679	25.13997284	25.58	4.338597	1.567574	2.605833
1998	28.69856	25.29521734	25.68	4.309456	1.702928	2.906491
1999	28.72147	25.47478406	26.03	4.000034	1.673351	3.059646
2000	28.72316	25.67411432	26.57	3.931826	1.665818	2.88926
2001	28.74633	26.05544825	26.83	4.183957	1.702928	2.906491
2002	28.90956	26.17633956	26.95	4.139557	1.423108	3.212858
2003	28.79518	26.40789811	27.08	4.124712	1.413423	3.030617
2004	28.7845	26.52874322	27.31	4.228657	1.432701	2.953868
2005	28.80727	26.58700581	27.58	4.259859	1.342865	2.88759
2006	28.81537	26.82311966	28.04	4.572823	1.144223	2.848392
2007	28.81632	26.91271201	28.47	4.421917	1.265538	2.82953

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2008	28.84585	27.56145607	28.93	4.464894	1.042079	2.717038
2009	28.88129	27.62445662	28.85	4.434383	0.984261	2.943956
2010	28.906	27.6185851	28.97	3.956746	0.790943	2.867082
2011	29.06995	27.68286692	29.22	3.801621	0.343973	2.77392
2012	29.19623	27.69712877	29.25	3.745092	0.529834	2.820802
2013	29.39341	27.79627399	29.27	3.625926	0.774093	2.816775
2014	29.53077	28.13025057	29.29	4.152723	1.218075	2.806289
2015	29.51606	28.1827159	29.40	4.242444	1.275974	2.824258
2016	29.47193	28.42660803	29.45	4.381401	1.320821	2.825423
2017	29.46981	28.40638052	29.49	4.288284	1.417468	2.86534
2018	29.49053	28.43309205	29.51	4.097051	1.404356	2.961486
2019	29.49817	28.59516434	29.57	4.072877	1.373601	2.742638
2020	29.47024	28.79147195	30.04	4.06644	1.170675	2.51117

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2. UNIT ROOT TESTS (ADF and PP)

LMNOUT

Null Hypothesis: LMNOUT has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.353406	0.5945
Test critical values:	1% level	-3.615588	

	5% level	-2.941145
	10% level	-2.609066

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LMNOUT)
Method: Least Squares
Date: 01/13/22 Time: 16:01
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMNOUT(-1)	-0.091071	0.067291	-1.353406	0.1846
D(LMNOUT(-1))	0.338681	0.158579	2.135726	0.0398
C	2.645784	1.951025	1.356099	0.1838

R-squared	0.130842	Mean dependent var	0.006127
Adjusted R-squared	0.081176	S.D. dependent var	0.111857
S.E. of regression	0.107221	Akaike info criterion	-1.552195
Sum squared resid	0.402371	Schwarz criterion	-1.422912
Log likelihood	32.49171	Hannan-Quinn criter.	-1.506197
F-statistic	2.634435	Durbin-Watson stat	1.977552
Prob(F-statistic)	0.085946		

Null Hypothesis: LMNOUT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.405462	0.3711
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LMNOUT)
Method: Least Squares
Date: 01/13/22 Time: 16:07
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMNOUT(-1)	-0.174284	0.072453	-2.405462	0.0217
D(LMNOUT(-1))	0.235418	0.155438	1.514546	0.1391
C	4.970041	2.082732	2.386309	0.0227
@TREND("1981")	0.004328	0.001834	2.359250	0.0242

R-squared	0.253113	Mean dependent var	0.006127
Adjusted R-squared	0.187212	S.D. dependent var	0.111857
S.E. of regression	0.100844	Akaike info criterion	-1.651175
Sum squared resid	0.345766	Schwarz criterion	-1.478797

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Log likelihood	35.37232	Hannan-Quinn criter.	-1.589844
F-statistic	3.840767	Durbin-Watson stat	1.863912
Prob(F-statistic)	0.018036		

Null Hypothesis: LMNOUT has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.292535	0.7654
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LMNOUT)
Method: Least Squares
Date: 01/13/22 Time: 16:12
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMNOUT(-1)	0.000178	0.000607	0.292535	0.7716
D(LMNOUT(-1))	0.284401	0.155222	1.832222	0.0752

R-squared	0.085174	Mean dependent var	0.006127
Adjusted R-squared	0.059762	S.D. dependent var	0.111857
S.E. of regression	0.108463	Akaike info criterion	-1.553617
Sum squared resid	0.423513	Schwarz criterion	-1.467429
Log likelihood	31.51873	Hannan-Quinn criter.	-1.522952
Durbin-Watson stat	1.964296		

Null Hypothesis: D(LMNOUT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.610495	0.0007
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LMNOUT,2)
Method: Least Squares
Date: 01/13/22 Time: 16:13
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LMNOUT(-1))	-0.715537	0.155198	-4.610495	0.0000
C	0.005359	0.017598	0.304508	0.7625

R-squared	0.371252	Mean dependent var	0.003427
Adjusted R-squared	0.353787	S.D. dependent var	0.134912
S.E. of regression	0.108452	Akaike info criterion	-1.553816
Sum squared resid	0.423429	Schwarz criterion	-1.467627
Log likelihood	31.52250	Hannan-Quinn criter.	-1.523150
F-statistic	21.25666	Durbin-Watson stat	1.964417
Prob(F-statistic)	0.000049		

Null Hypothesis: D(LMNOUT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.795377	0.0022
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LMNOUT,2)
Method: Least Squares
Date: 01/13/22 Time: 16:17
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LMNOUT(-1))	-0.792498	0.165263	-4.795377	0.0000
C	-0.039118	0.038982	-1.003493	0.3225
@TREND("1981")	0.002180	0.001708	1.275882	0.2104

R-squared	0.399196	Mean dependent var	0.003427
Adjusted R-squared	0.364864	S.D. dependent var	0.134912
S.E. of regression	0.107519	Akaike info criterion	-1.546645
Sum squared resid	0.404610	Schwarz criterion	-1.417362
Log likelihood	32.38626	Hannan-Quinn criter.	-1.500647
F-statistic	11.62763	Durbin-Watson stat	1.898243
Prob(F-statistic)	0.000134		

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Null Hypothesis: D(LMNOUT) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.662063	0.0000
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LMNOUT,2)
Method: Least Squares
Date: 01/13/22 Time: 16:19
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LMNOUT(-1))	-0.714412	0.153239	-4.662063	0.0000

R-squared	0.369633	Mean dependent var	0.003427
Adjusted R-squared	0.369633	S.D. dependent var	0.134912
S.E. of regression	0.107114	Akaike info criterion	-1.603875
Sum squared resid	0.424520	Schwarz criterion	-1.560780
Log likelihood	31.47362	Hannan-Quinn criter.	-1.588542
Durbin-Watson stat	1.961669		

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DMBCMS

Null Hypothesis: LDMBCMS has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.873167	0.7862
Test critical values:	1% level	-3.610453	

	5% level	-2.938987
	10% level	-2.607932

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDMBCMS)
Method: Least Squares
Date: 01/13/22 Time: 16:21
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS(-1)	-0.009154	0.010484	-0.873167	0.3882
C	0.414020	0.267081	1.550167	0.1296

R-squared	0.020190	Mean dependent var	0.181794
Adjusted R-squared	-0.006291	S.D. dependent var	0.152250
S.E. of regression	0.152729	Akaike info criterion	-0.870389
Sum squared resid	0.863062	Schwarz criterion	-0.785078
Log likelihood	18.97258	Hannan-Quinn criter.	-0.839780
F-statistic	0.762420	Durbin-Watson stat	1.637355
Prob(F-statistic)	0.388204		

Null Hypothesis: LDMBCMS has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.736201	0.9629
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDMBCMS)
Method: Least Squares
Date: 01/13/22 Time: 16:23
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS(-1)	-0.051514	0.069973	-0.736201	0.4664
C	1.310947	1.489163	0.880325	0.3845
@TREND("1981")	0.008882	0.014503	0.612405	0.5441

R-squared	0.030292	Mean dependent var	0.181794
Adjusted R-squared	-0.023581	S.D. dependent var	0.152250
S.E. of regression	0.154035	Akaike info criterion	-0.829471
Sum squared resid	0.854164	Schwarz criterion	-0.701504
Log likelihood	19.17468	Hannan-Quinn criter.	-0.783557
F-statistic	0.562291	Durbin-Watson stat	1.585955

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Prob(F-statistic)	0.574826

Null Hypothesis: LDMBCMS has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		7.190732	1.0000
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDMBCMS)
Method: Least Squares
Date: 01/13/22 Time: 16:28
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS(-1)	0.007030	0.000978	7.190732	0.0000

R-squared	-0.043445	Mean dependent var	0.181794
Adjusted R-squared	-0.043445	S.D. dependent var	0.152250
S.E. of regression	0.155522	Akaike info criterion	-0.858746
Sum squared resid	0.919115	Schwarz criterion	-0.816091
Log likelihood	17.74555	Hannan-Quinn criter.	-0.843442
Durbin-Watson stat	1.562158		

Null Hypothesis: D(LDMBCMS) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.982992	0.0013
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDMBCMS,2)
Method: Least Squares
Date: 01/13/22 Time: 16:30
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

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D(LDMBCMS(-1))	-0.827203	0.166005	-4.982992	0.0000
C	0.186467	0.064415	2.894785	0.0065
@TREND("1981")	-0.001694	0.002305	-0.735166	0.4671

R-squared	0.415052	Mean dependent var	0.001671
Adjusted R-squared	0.381626	S.D. dependent var	0.196298
S.E. of regression	0.154362	Akaike info criterion	-0.823372
Sum squared resid	0.833970	Schwarz criterion	-0.694089
Log likelihood	18.64407	Hannan-Quinn criter.	-0.777374
F-statistic	12.41718	Durbin-Watson stat	2.045346
Prob(F-statistic)	0.000084		

Null Hypothesis: D(LDMBCMS) has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.435021	0.1387
Test critical values:	1% level	-2.628961	
	5% level	-1.950117	
	10% level	-1.611339	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDMBCMS,2)
Method: Least Squares
Date: 01/13/22 Time: 16:31
Sample (adjusted): 1984 2020
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDMBCMS(-1))	-0.180985	0.126120	-1.435021	0.1602
D(LDMBCMS(-1),2)	-0.422770	0.153617	-2.752108	0.0093

R-squared	0.307091	Mean dependent var	0.005168
Adjusted R-squared	0.287294	S.D. dependent var	0.197802
S.E. of regression	0.166988	Akaike info criterion	-0.689250
Sum squared resid	0.975976	Schwarz criterion	-0.602174
Log likelihood	14.75113	Hannan-Quinn criter.	-0.658552
Durbin-Watson stat	2.065087		

LDD

Null Hypothesis: LDD has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.615886	0.8555
Test critical values:	1% level	-3.610453	

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	5% level	-2.938987
	10% level	-2.607932

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDD)
Method: Least Squares
Date: 01/13/22 Time: 16:33
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDD(-1)	-0.006410	0.010408	-0.615886	0.5417
C	0.233417	0.063330	3.685695	0.0007

R-squared	0.010148	Mean dependent var	0.198159
Adjusted R-squared	-0.016605	S.D. dependent var	0.167747
S.E. of regression	0.169134	Akaike info criterion	-0.666332
Sum squared resid	1.058432	Schwarz criterion	-0.581021
Log likelihood	14.99348	Hannan-Quinn criter.	-0.635723
F-statistic	0.379316	Durbin-Watson stat	1.247729
Prob(F-statistic)	0.541740		

Null Hypothesis: LDD has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.640514	0.7576
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDD)
Method: Least Squares
Date: 01/13/22 Time: 16:39
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDD(-1)	-0.109938	0.067015	-1.640514	0.1101
D(LDD(-1))	0.456913	0.173092	2.639710	0.0124
C	0.227519	0.079805	2.850937	0.0074
@TREND("1981")	0.024537	0.015755	1.557451	0.1286

R-squared	0.192557	Mean dependent var	0.201805
Adjusted R-squared	0.121312	S.D. dependent var	0.168425
S.E. of regression	0.157879	Akaike info criterion	-0.754673
Sum squared resid	0.847478	Schwarz criterion	-0.582296
Log likelihood	18.33880	Hannan-Quinn criter.	-0.693343

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F-statistic	2.702740	Durbin-Watson stat	2.042079
Prob(F-statistic)	0.060838		

Null Hypothesis: LDD has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.228795	0.9927
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDD)
Method: Least Squares
Date: 01/13/22 Time: 16:40
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDD(-1)	0.013467	0.006042	2.228795	0.0322
D(LDD(-1))	0.545777	0.148689	3.670580	0.0008

R-squared	-0.003063	Mean dependent var	0.201805
Adjusted R-squared	-0.030925	S.D. dependent var	0.168425
S.E. of regression	0.171010	Akaike info criterion	-0.642996
Sum squared resid	1.052796	Schwarz criterion	-0.556808
Log likelihood	14.21693	Hannan-Quinn criter.	-0.612331
Durbin-Watson stat	2.006385		

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Null Hypothesis: D(LDD) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.978358	0.0039
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDD,2)
Method: Least Squares
Date: 01/13/22 Time: 16:41
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDD(-1))	-0.637693	0.160290	-3.978358	0.0003
C	0.132597	0.040117	3.305271	0.0022

R-squared	0.305386	Mean dependent var	0.010787
Adjusted R-squared	0.286091	S.D. dependent var	0.189112
S.E. of regression	0.159786	Akaike info criterion	-0.778763
Sum squared resid	0.919140	Schwarz criterion	-0.692575
Log likelihood	16.79650	Hannan-Quinn criter.	-0.748098
F-statistic	15.82733	Durbin-Watson stat	1.908466
Prob(F-statistic)	0.000321		

Null Hypothesis: D(LDD) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.947635	0.0194
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDD,2)
Method: Least Squares
Date: 01/13/22 Time: 16:43
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDD(-1))	-0.649067	0.164419	-3.947635	0.0004
C	0.155578	0.068269	2.278908	0.0289
@TREND("1981")	-0.001015	0.002425	-0.418624	0.6780

R-squared	0.308846	Mean dependent var	0.010787
Adjusted R-squared	0.269352	S.D. dependent var	0.189112
S.E. of regression	0.161649	Akaike info criterion	-0.731126
Sum squared resid	0.914560	Schwarz criterion	-0.601843
Log likelihood	16.89140	Hannan-Quinn criter.	-0.685128
F-statistic	7.819988	Durbin-Watson stat	1.898995
Prob(F-statistic)	0.001558		

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Null Hypothesis: D(LDD) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.000538	0.0448
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDD,2)
Method: Least Squares
Date: 01/13/22 Time: 16:45
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDD(-1))	-0.233332	0.116635	-2.000538	0.0528

R-squared	0.094593	Mean dependent var	0.010787
Adjusted R-squared	0.094593	S.D. dependent var	0.189112
S.E. of regression	0.179945	Akaike info criterion	-0.566367
Sum squared resid	1.198068	Schwarz criterion	-0.523273
Log likelihood	11.76098	Hannan-Quinn criter.	-0.551035
Durbin-Watson stat	2.165346		

LLDR

Null Hypothesis: LLDR has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.638342	0.0007
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LLDR)
Method: Least Squares
Date: 01/13/22 Time: 16:53
Sample (adjusted): 1985 2020
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

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LLDR(-1)	-0.836905	0.180432	-4.638342	0.0001
D(LLDR(-1))	0.416065	0.166258	2.502524	0.0178
D(LLDR(-2))	0.349980	0.162940	2.147908	0.0396
D(LLDR(-3))	0.397353	0.162116	2.451038	0.0201
C	3.495469	0.756242	4.622157	0.0001

R-squared	0.411533	Mean dependent var	-0.009418
Adjusted R-squared	0.335602	S.D. dependent var	0.195913
S.E. of regression	0.159690	Akaike info criterion	-0.702917
Sum squared resid	0.790529	Schwarz criterion	-0.482984
Log likelihood	17.65251	Hannan-Quinn criter.	-0.626155
F-statistic	5.419820	Durbin-Watson stat	1.772910
Prob(F-statistic)	0.001989		

Null Hypothesis: LLDR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.970576	0.0015
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LLDR)
Method: Least Squares
Date: 01/13/22 Time: 16:56
Sample (adjusted): 1985 2020
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLDR(-1)	-0.938629	0.188837	-4.970576	0.0000
D(LLDR(-1))	0.476470	0.167546	2.843819	0.0080
D(LLDR(-2))	0.407443	0.163937	2.485361	0.0187
D(LLDR(-3))	0.456333	0.163384	2.793005	0.0090
C	4.009947	0.813645	4.928371	0.0000
@TREND("1981")	-0.004103	0.002689	-1.526213	0.1374

R-squared	0.453932	Mean dependent var	-0.009418
Adjusted R-squared	0.362921	S.D. dependent var	0.195913
S.E. of regression	0.156373	Akaike info criterion	-0.722139
Sum squared resid	0.733571	Schwarz criterion	-0.458219
Log likelihood	18.99850	Hannan-Quinn criter.	-0.630024
F-statistic	4.987649	Durbin-Watson stat	1.799108
Prob(F-statistic)	0.001926		

Null Hypothesis: LLDR has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*

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Augmented Dickey-Fuller test statistic		-0.343701	0.5548
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LLDR)
Method: Least Squares
Date: 01/13/22 Time: 16:58
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLDR(-1)	-0.002478	0.007209	-0.343701	0.7330

R-squared	0.001978	Mean dependent var	-0.006266
Adjusted R-squared	0.001978	S.D. dependent var	0.189307
S.E. of regression	0.189120	Akaike info criterion	-0.467566
Sum squared resid	1.359119	Schwarz criterion	-0.424911
Log likelihood	10.11754	Hannan-Quinn criter.	-0.452262
Durbin-Watson stat	2.013237		

LDIR

Null Hypothesis: LDIR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.851259	0.7929
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDIR)
Method: Least Squares
Date: 01/13/22 Time: 17:01
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDIR(-1)	-0.045775	0.053773	-0.851259	0.4001
C	0.064213	0.101174	0.634679	0.5295

R-squared	0.019209	Mean dependent var	-0.015925
Adjusted R-squared	-0.007299	S.D. dependent var	0.230618
S.E. of regression	0.231458	Akaike info criterion	-0.038918
Sum squared resid	1.982190	Schwarz criterion	0.046393
Log likelihood	2.758902	Hannan-Quinn criter.	-0.008309
F-statistic	0.724643	Durbin-Watson stat	1.817055

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Prob(F-statistic)	0.400101

Null Hypothesis: LDIR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.149659	0.5031
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDIR)
Method: Least Squares
Date: 01/13/22 Time: 17:03
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDIR(-1)	-0.171689	0.079868	-2.149659	0.0384
C	0.486559	0.226445	2.148684	0.0385
@TREND("1981")	-0.010096	0.004891	-2.064030	0.0463

R-squared	0.122993	Mean dependent var	-0.015925
Adjusted R-squared	0.074271	S.D. dependent var	0.230618
S.E. of regression	0.221888	Akaike info criterion	-0.099481
Sum squared resid	1.772441	Schwarz criterion	0.028485
Log likelihood	4.939879	Hannan-Quinn criter.	-0.053568
F-statistic	2.524357	Durbin-Watson stat	1.790865
Prob(F-statistic)	0.094200		

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Null Hypothesis: LDIR has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.717313	0.3995
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDIR)
Method: Least Squares
Date: 01/13/22 Time: 17:05
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDIR(-1)	-0.014019	0.019543	-0.717313	0.4776

R-squared	0.008531	Mean dependent var	-0.015925
Adjusted R-squared	0.008531	S.D. dependent var	0.230618
S.E. of regression	0.229632	Akaike info criterion	-0.079372
Sum squared resid	2.003770	Schwarz criterion	-0.036717
Log likelihood	2.547753	Hannan-Quinn criter.	-0.064068
Durbin-Watson stat	1.855494		

Null Hypothesis: D(LDIR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.764666	0.0000
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDIR,2)
Method: Least Squares
Date: 01/13/22 Time: 17:06
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDIR(-1))	-0.954240	0.165533	-5.764666	0.0000
C	-0.021713	0.037878	-0.573234	0.5701

R-squared	0.480005	Mean dependent var	-0.011212
Adjusted R-squared	0.465560	S.D. dependent var	0.319027
S.E. of regression	0.233226	Akaike info criterion	-0.022422
Sum squared resid	1.958197	Schwarz criterion	0.063767
Log likelihood	2.426018	Hannan-Quinn criter.	0.008243
F-statistic	33.23137	Durbin-Watson stat	1.995369
Prob(F-statistic)	0.000001		

Null Hypothesis: D(LDIR) has a unit root
Exogenous: Constant, Linear Trend

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Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.701946	0.0002
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDIR,2)
Method: Least Squares
Date: 01/13/22 Time: 17:07
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDIR(-1))	-0.958041	0.168020	-5.701946	0.0000
C	0.001853	0.081283	0.022797	0.9819
@TREND("1981")	-0.001152	0.003502	-0.328838	0.7442

R-squared	0.481606	Mean dependent var	-0.011212
Adjusted R-squared	0.451984	S.D. dependent var	0.319027
S.E. of regression	0.236170	Akaike info criterion	0.027125
Sum squared resid	1.952165	Schwarz criterion	0.156408
Log likelihood	2.484629	Hannan-Quinn criter.	0.073123
F-statistic	16.25812	Durbin-Watson stat	1.993089
Prob(F-statistic)	0.000010		

Null Hypothesis: D(LDIR) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.796578	0.0000
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDIR,2)
Method: Least Squares
Date: 01/13/22 Time: 17:08
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDIR(-1))	-0.949676	0.163834	-5.796578	0.0000

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R-squared	0.475258	Mean dependent var	-0.011212
Adjusted R-squared	0.475258	S.D. dependent var	0.319027
S.E. of regression	0.231100	Akaike info criterion	-0.065967
Sum squared resid	1.976070	Schwarz criterion	-0.022873
Log likelihood	2.253379	Hannan-Quinn criter.	-0.050635
Durbin-Watson stat	1.987169		

LLIR

Null Hypothesis: LLIR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.481520	0.0139
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LLIR)
Method: Least Squares
Date: 01/13/22 Time: 17:11
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLIR(-1)	-0.384635	0.110479	-3.481520	0.0013
C	1.100675	0.314254	3.502507	0.0012

R-squared	0.246758	Mean dependent var	0.011884
Adjusted R-squared	0.226400	S.D. dependent var	0.219130
S.E. of regression	0.192735	Akaike info criterion	-0.405085
Sum squared resid	1.374425	Schwarz criterion	-0.319774
Log likelihood	9.899157	Hannan-Quinn criter.	-0.374476
F-statistic	12.12098	Durbin-Watson stat	2.306673
Prob(F-statistic)	0.001297		

Null Hypothesis: LLIR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.108988	0.1184
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LLIR)
Method: Least Squares
Date: 01/13/22 Time: 17:12
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLIR(-1)	-0.364742	0.117318	-3.108988	0.0037
C	1.076223	0.320406	3.358938	0.0019
@TREND("1981")	-0.001593	0.002912	-0.547043	0.5877

R-squared	0.252968	Mean dependent var	0.011884
Adjusted R-squared	0.211466	S.D. dependent var	0.219130
S.E. of regression	0.194586	Akaike info criterion	-0.362081
Sum squared resid	1.363094	Schwarz criterion	-0.234115
Log likelihood	10.06058	Hannan-Quinn criter.	-0.316168
F-statistic	6.095339	Durbin-Watson stat	2.375424
Prob(F-statistic)	0.005249		

Null Hypothesis: LLIR has a unit root
Exogenous: None
Lag Length: 2 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.202138	0.7393
Test critical values:	1% level	-2.628961	
	5% level	-1.950117	
	10% level	-1.611339	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LLIR)
Method: Least Squares
Date: 01/13/22 Time: 17:13
Sample (adjusted): 1984 2020
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLIR(-1)	0.002474	0.012240	0.202138	0.8410
D(LLIR(-1))	-0.409754	0.176791	-2.317729	0.0266
D(LLIR(-2))	-0.140669	0.175663	-0.800788	0.4288

R-squared	0.136439	Mean dependent var	0.005637
Adjusted R-squared	0.085641	S.D. dependent var	0.220494
S.E. of regression	0.210841	Akaike info criterion	-0.197820
Sum squared resid	1.511434	Schwarz criterion	-0.067205
Log likelihood	6.659670	Hannan-Quinn criter.	-0.151772
Durbin-Watson stat	1.868987		

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PHILIPS PERRON UNIT ROOT TEST

LMNOUT

Null Hypothesis: LMNOUT has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.485072	0.5305
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Residual variance (no correction)	0.012140
HAC corrected variance (Bartlett kernel)	0.019551

Phillips-Perron Test Equation
Dependent Variable: D(LMNOUT)
Method: Least Squares
Date: 01/14/22 Time: 13:41
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMNOUT(-1)	-0.074152	0.066788	-1.110260	0.2741
C	2.152677	1.937255	1.111200	0.2737

R-squared	0.032241	Mean dependent var	0.001915
Adjusted R-squared	0.006086	S.D. dependent var	0.113467
S.E. of regression	0.113121	Akaike info criterion	-1.470798
Sum squared resid	0.473465	Schwarz criterion	-1.385487
Log likelihood	30.68055	Hannan-Quinn criter.	-1.440189
F-statistic	1.232678	Durbin-Watson stat	1.319661
Prob(F-statistic)	0.274050		

Null Hypothesis: LMNOUT has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.518701	0.3179
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	

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	10% level	-3.196411

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

Residual variance (no correction)	0.009464
HAC corrected variance (Bartlett kernel)	0.012400

Phillips-Perron Test Equation
Dependent Variable: D(LMNOUT)
Method: Least Squares
Date: 01/14/22 Time: 13:45
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMNOUT(-1)	-0.165590	0.066297	-2.497706	0.0172
C	4.702883	1.909404	2.463011	0.0187
@TREND("1981")	0.005097	0.001598	3.190546	0.0029

R-squared	0.245569	Mean dependent var	0.001915
Adjusted R-squared	0.203656	S.D. dependent var	0.113467
S.E. of regression	0.101256	Akaike info criterion	-1.668534
Sum squared resid	0.369097	Schwarz criterion	-1.540568
Log likelihood	35.53642	Hannan-Quinn criter.	-1.622621
F-statistic	5.859043	Durbin-Watson stat	1.547494
Prob(F-statistic)	0.006268		

Null Hypothesis: LMNOUT has a unit root
Exogenous: None
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.076910	0.7014
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

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

Residual variance (no correction)	0.012545
HAC corrected variance (Bartlett kernel)	0.017339

Phillips-Perron Test Equation
Dependent Variable: D(LMNOUT)
Method: Least Squares
Date: 01/14/22 Time: 13:46
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMNOUT(-1)	5.95E-05	0.000626	0.095024	0.9248

R-squared	-0.000055	Mean dependent var	0.001915
Adjusted R-squared	-0.000055	S.D. dependent var	0.113467
S.E. of regression	0.113470	Akaike info criterion	-1.489252
Sum squared resid	0.489266	Schwarz criterion	-1.446597
Log likelihood	30.04042	Hannan-Quinn criter.	-1.473948
Durbin-Watson stat	1.377444		

Null Hypothesis: D(LMNOUT) has a unit root
Exogenous: Constant
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.610495	0.0007
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Residual variance (no correction)	0.011143
HAC corrected variance (Bartlett kernel)	0.011143

Phillips-Perron Test Equation
Dependent Variable: D(LMNOUT,2)
Method: Least Squares
Date: 01/14/22 Time: 13:46
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LMNOUT(-1))	-0.715537	0.155198	-4.610495	0.0000
C	0.005359	0.017598	0.304508	0.7625

R-squared	0.371252	Mean dependent var	0.003427
Adjusted R-squared	0.353787	S.D. dependent var	0.134912
S.E. of regression	0.108452	Akaike info criterion	-1.553816
Sum squared resid	0.423429	Schwarz criterion	-1.467627
Log likelihood	31.52250	Hannan-Quinn criter.	-1.523150
F-statistic	21.25666	Durbin-Watson stat	1.964417
Prob(F-statistic)	0.000049		

Null Hypothesis: D(LMNOUT) has a unit root
Exogenous: Constant, Linear Trend

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

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.765463	0.0024
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Residual variance (no correction)	0.010648
HAC corrected variance (Bartlett kernel)	0.010117

Phillips-Perron Test Equation
Dependent Variable: D(LMNOUT,2)
Method: Least Squares
Date: 01/14/22 Time: 13:47
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LMNOUT(-1))	-0.792498	0.165263	-4.795377	0.0000
C	-0.039118	0.038982	-1.003493	0.3225
@TREND("1981")	0.002180	0.001708	1.275882	0.2104

R-squared	0.399196	Mean dependent var	0.003427
Adjusted R-squared	0.364864	S.D. dependent var	0.134912
S.E. of regression	0.107519	Akaike info criterion	-1.546645
Sum squared resid	0.404610	Schwarz criterion	-1.417362
Log likelihood	32.38626	Hannan-Quinn criter.	-1.500647
F-statistic	11.62763	Durbin-Watson stat	1.898243
Prob(F-statistic)	0.000134		

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Null Hypothesis: D(LMNOUT) has a unit root
Exogenous: None
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.662063	0.0000
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

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

Residual variance (no correction)	0.011172
HAC corrected variance (Bartlett kernel)	0.011172

Phillips-Perron Test Equation
Dependent Variable: D(LMNOUT,2)
Method: Least Squares
Date: 01/14/22 Time: 13:48
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LMNOUT(-1))	-0.714412	0.153239	-4.662063	0.0000

R-squared	0.369633	Mean dependent var	0.003427
Adjusted R-squared	0.369633	S.D. dependent var	0.134912
S.E. of regression	0.107114	Akaike info criterion	-1.603875
Sum squared resid	0.424520	Schwarz criterion	-1.560780
Log likelihood	31.47362	Hannan-Quinn criter.	-1.588542
Durbin-Watson stat	1.961669		

LMDBCMS

Null Hypothesis: LDMBCMS has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.810661	0.8049
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Residual variance (no correction)	0.022130
HAC corrected variance (Bartlett kernel)	0.030017

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS)
Method: Least Squares
Date: 01/14/22 Time: 13:50
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS(-1)	-0.009154	0.010484	-0.873167	0.3882
C	0.414020	0.267081	1.550167	0.1296

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R-squared	0.020190	Mean dependent var	0.181794
Adjusted R-squared	-0.006291	S.D. dependent var	0.152250
S.E. of regression	0.152729	Akaike info criterion	-0.870389
Sum squared resid	0.863062	Schwarz criterion	-0.785078
Log likelihood	18.97258	Hannan-Quinn criter.	-0.839780
F-statistic	0.762420	Durbin-Watson stat	1.637355
Prob(F-statistic)	0.388204		

Null Hypothesis: LDMBCMS has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.074699	0.9205
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

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

Residual variance (no correction)	0.021902
HAC corrected variance (Bartlett kernel)	0.030944

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS)
Method: Least Squares
Date: 01/14/22 Time: 13:51
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS(-1)	-0.051514	0.069973	-0.736201	0.4664
C	1.310947	1.489163	0.880325	0.3845
@TREND("1981")	0.008882	0.014503	0.612405	0.5441

R-squared	0.030292	Mean dependent var	0.181794
Adjusted R-squared	-0.023581	S.D. dependent var	0.152250
S.E. of regression	0.154035	Akaike info criterion	-0.829471
Sum squared resid	0.854164	Schwarz criterion	-0.701504
Log likelihood	19.17468	Hannan-Quinn criter.	-0.783557
F-statistic	0.562291	Durbin-Watson stat	1.585955
Prob(F-statistic)	0.574826		

Null Hypothesis: LDMBCMS has a unit root
Exogenous: None
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*

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Phillips-Perron test statistic		5.744059	1.0000
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

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

Residual variance (no correction)	0.023567
HAC corrected variance (Bartlett kernel)	0.036824

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS)
Method: Least Squares
Date: 01/14/22 Time: 13:52
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS(-1)	0.007030	0.000978	7.190732	0.0000

R-squared	-0.043445	Mean dependent var	0.181794
Adjusted R-squared	-0.043445	S.D. dependent var	0.152250
S.E. of regression	0.155522	Akaike info criterion	-0.858746
Sum squared resid	0.919115	Schwarz criterion	-0.816091
Log likelihood	17.74555	Hannan-Quinn criter.	-0.843442
Durbin-Watson stat	1.562158		

Null Hypothesis: D(LDMBCMS) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.938064	0.0003
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Residual variance (no correction)	0.022285
HAC corrected variance (Bartlett kernel)	0.021330

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS,2)
Method: Least Squares
Date: 01/14/22 Time: 13:53
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDMBCMS(-1))	-0.810761	0.163439	-4.960645	0.0000
C	0.148752	0.038706	3.843148	0.0005

R-squared	0.406019	Mean dependent var	0.001671
Adjusted R-squared	0.389520	S.D. dependent var	0.196298
S.E. of regression	0.153374	Akaike info criterion	-0.860680
Sum squared resid	0.846848	Schwarz criterion	-0.774491
Log likelihood	18.35292	Hannan-Quinn criter.	-0.830014
F-statistic	24.60800	Durbin-Watson stat	2.051811
Prob(F-statistic)	0.000017		

Null Hypothesis: D(LDMBCMS) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.982992	0.0013
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Residual variance (no correction)	0.021947
HAC corrected variance (Bartlett kernel)	0.021947

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS,2)
Method: Least Squares
Date: 01/14/22 Time: 13:55
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDMBCMS(-1))	-0.827203	0.166005	-4.982992	0.0000
C	0.186467	0.064415	2.894785	0.0065
@TREND("1981")	-0.001694	0.002305	-0.735166	0.4671

R-squared	0.415052	Mean dependent var	0.001671
Adjusted R-squared	0.381626	S.D. dependent var	0.196298
S.E. of regression	0.154362	Akaike info criterion	-0.823372
Sum squared resid	0.833970	Schwarz criterion	-0.694089
Log likelihood	18.64407	Hannan-Quinn criter.	-0.777374
F-statistic	12.41718	Durbin-Watson stat	2.045346
Prob(F-statistic)	0.000084		

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Null Hypothesis: D(LDMBCMS) has a unit root
Exogenous: None
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.550056	0.0122
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

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

Residual variance (no correction)	0.031429
HAC corrected variance (Bartlett kernel)	0.027350

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS,2)
Method: Least Squares
Date: 01/14/22 Time: 13:56
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDMBCMS(-1))	-0.329606	0.123066	-2.678280	0.0110

R-squared	0.162325	Mean dependent var	0.001671
Adjusted R-squared	0.162325	S.D. dependent var	0.196298
S.E. of regression	0.179661	Akaike info criterion	-0.569529
Sum squared resid	1.194286	Schwarz criterion	-0.526435
Log likelihood	11.82105	Hannan-Quinn criter.	-0.554196
Durbin-Watson stat	2.538120		

Null Hypothesis: LDMBCMS has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.810661	0.8049
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Residual variance (no correction)	0.022130
HAC corrected variance (Bartlett kernel)	0.030017

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Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS)
Method: Least Squares
Date: 01/14/22 Time: 13:50
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS(-1)	-0.009154	0.010484	-0.873167	0.3882
C	0.414020	0.267081	1.550167	0.1296

R-squared	0.020190	Mean dependent var	0.181794
Adjusted R-squared	-0.006291	S.D. dependent var	0.152250
S.E. of regression	0.152729	Akaike info criterion	-0.870389
Sum squared resid	0.863062	Schwarz criterion	-0.785078
Log likelihood	18.97258	Hannan-Quinn criter.	-0.839780
F-statistic	0.762420	Durbin-Watson stat	1.637355
Prob(F-statistic)	0.388204		

Null Hypothesis: LDMBCMS has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.074699	0.9205
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

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

Residual variance (no correction)	0.021902
HAC corrected variance (Bartlett kernel)	0.030944

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS)
Method: Least Squares
Date: 01/14/22 Time: 13:51
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS(-1)	-0.051514	0.069973	-0.736201	0.4664
C	1.310947	1.489163	0.880325	0.3845
@TREND("1981")	0.008882	0.014503	0.612405	0.5441

R-squared	0.030292	Mean dependent var	0.181794
Adjusted R-squared	-0.023581	S.D. dependent var	0.152250

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S.E. of regression	0.154035	Akaike info criterion	-0.829471
Sum squared resid	0.854164	Schwarz criterion	-0.701504
Log likelihood	19.17468	Hannan-Quinn criter.	-0.783557
F-statistic	0.562291	Durbin-Watson stat	1.585955
Prob(F-statistic)	0.574826		

Null Hypothesis: LDMBCMS has a unit root
Exogenous: None
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		5.744059	1.0000
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

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

Residual variance (no correction)	0.023567
HAC corrected variance (Bartlett kernel)	0.036824

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS)
Method: Least Squares
Date: 01/14/22 Time: 13:52
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS(-1)	0.007030	0.000978	7.190732	0.0000

R-squared	-0.043445	Mean dependent var	0.181794
Adjusted R-squared	-0.043445	S.D. dependent var	0.152250
S.E. of regression	0.155522	Akaike info criterion	-0.858746
Sum squared resid	0.919115	Schwarz criterion	-0.816091
Log likelihood	17.74555	Hannan-Quinn criter.	-0.843442
Durbin-Watson stat	1.562158		

Null Hypothesis: D(LDMBCMS) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.938064	0.0003
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Residual variance (no correction)	0.022285
HAC corrected variance (Bartlett kernel)	0.021330

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS,2)
Method: Least Squares
Date: 01/14/22 Time: 13:53
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDMBCMS(-1))	-0.810761	0.163439	-4.960645	0.0000
C	0.148752	0.038706	3.843148	0.0005

R-squared	0.406019	Mean dependent var	0.001671
Adjusted R-squared	0.389520	S.D. dependent var	0.196298
S.E. of regression	0.153374	Akaike info criterion	-0.860680
Sum squared resid	0.846848	Schwarz criterion	-0.774491
Log likelihood	18.35292	Hannan-Quinn criter.	-0.830014
F-statistic	24.60800	Durbin-Watson stat	2.051811
Prob(F-statistic)	0.000017		

Null Hypothesis: D(LDMBCMS) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.982992	0.0013
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Residual variance (no correction)	0.021947
HAC corrected variance (Bartlett kernel)	0.021947

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS,2)
Method: Least Squares
Date: 01/14/22 Time: 13:55
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

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D(LDMBCMS(-1))	-0.827203	0.166005	-4.982992	0.0000
C	0.186467	0.064415	2.894785	0.0065
@TREND("1981")	-0.001694	0.002305	-0.735166	0.4671

R-squared	0.415052	Mean dependent var	0.001671
Adjusted R-squared	0.381626	S.D. dependent var	0.196298
S.E. of regression	0.154362	Akaike info criterion	-0.823372
Sum squared resid	0.833970	Schwarz criterion	-0.694089
Log likelihood	18.64407	Hannan-Quinn criter.	-0.777374
F-statistic	12.41718	Durbin-Watson stat	2.045346
Prob(F-statistic)	0.000084		

Null Hypothesis: D(LDMBCMS) has a unit root
Exogenous: None
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.550056	0.0122
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

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

Residual variance (no correction)	0.031429
HAC corrected variance (Bartlett kernel)	0.027350

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS,2)
Method: Least Squares
Date: 01/14/22 Time: 13:56
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDMBCMS(-1))	-0.329606	0.123066	-2.678280	0.0110

R-squared	0.162325	Mean dependent var	0.001671
Adjusted R-squared	0.162325	S.D. dependent var	0.196298
S.E. of regression	0.179661	Akaike info criterion	-0.569529
Sum squared resid	1.194286	Schwarz criterion	-0.526435
Log likelihood	11.82105	Hannan-Quinn criter.	-0.554196
Durbin-Watson stat	2.538120		

Null Hypothesis: LDMBCMS has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

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		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.810661	0.8049
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Residual variance (no correction)	0.022130
HAC corrected variance (Bartlett kernel)	0.030017

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS)
Method: Least Squares
Date: 01/14/22 Time: 13:50
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS(-1)	-0.009154	0.010484	-0.873167	0.3882
C	0.414020	0.267081	1.550167	0.1296

R-squared	0.020190	Mean dependent var	0.181794
Adjusted R-squared	-0.006291	S.D. dependent var	0.152250
S.E. of regression	0.152729	Akaike info criterion	-0.870389
Sum squared resid	0.863062	Schwarz criterion	-0.785078
Log likelihood	18.97258	Hannan-Quinn criter.	-0.839780
F-statistic	0.762420	Durbin-Watson stat	1.637355
Prob(F-statistic)	0.388204		

Null Hypothesis: LDMBCMS has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.074699	0.9205
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

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

Residual variance (no correction)	0.021902
HAC corrected variance (Bartlett kernel)	0.030944

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS)
Method: Least Squares

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Date: 01/14/22 Time: 13:51
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS(-1)	-0.051514	0.069973	-0.736201	0.4664
C	1.310947	1.489163	0.880325	0.3845
@TREND("1981")	0.008882	0.014503	0.612405	0.5441

R-squared	0.030292	Mean dependent var	0.181794
Adjusted R-squared	-0.023581	S.D. dependent var	0.152250
S.E. of regression	0.154035	Akaike info criterion	-0.829471
Sum squared resid	0.854164	Schwarz criterion	-0.701504
Log likelihood	19.17468	Hannan-Quinn criter.	-0.783557
F-statistic	0.562291	Durbin-Watson stat	1.585955
Prob(F-statistic)	0.574826		

Null Hypothesis: LDMBCMS has a unit root
Exogenous: None
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		5.744059	1.0000
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

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

Residual variance (no correction)	0.023567
HAC corrected variance (Bartlett kernel)	0.036824

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS)
Method: Least Squares
Date: 01/14/22 Time: 13:52
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS(-1)	0.007030	0.000978	7.190732	0.0000

R-squared	-0.043445	Mean dependent var	0.181794
Adjusted R-squared	-0.043445	S.D. dependent var	0.152250
S.E. of regression	0.155522	Akaike info criterion	-0.858746
Sum squared resid	0.919115	Schwarz criterion	-0.816091
Log likelihood	17.74555	Hannan-Quinn criter.	-0.843442
Durbin-Watson stat	1.562158		

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Null Hypothesis: D(LDMBCMS) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.938064	0.0003
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Residual variance (no correction)	0.022285
HAC corrected variance (Bartlett kernel)	0.021330

Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS,2)
Method: Least Squares
Date: 01/14/22 Time: 13:53
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDMBCMS(-1))	-0.810761	0.163439	-4.960645	0.0000
C	0.148752	0.038706	3.843148	0.0005

R-squared	0.406019	Mean dependent var	0.001671
Adjusted R-squared	0.389520	S.D. dependent var	0.196298
S.E. of regression	0.153374	Akaike info criterion	-0.860680
Sum squared resid	0.846848	Schwarz criterion	-0.774491
Log likelihood	18.35292	Hannan-Quinn criter.	-0.830014
F-statistic	24.60800	Durbin-Watson stat	2.051811
Prob(F-statistic)	0.000017		

Null Hypothesis: D(LDMBCMS) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.982992	0.0013
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Residual variance (no correction)	0.021947
HAC corrected variance (Bartlett kernel)	0.021947

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Phillips-Perron Test Equation
Dependent Variable: D(LDMBCMS,2)
Method: Least Squares
Date: 01/14/22 Time: 13:55
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDMBCMS(-1))	-0.827203	0.166005	-4.982992	0.0000
C	0.186467	0.064415	2.894785	0.0065
@TREND("1981")	-0.001694	0.002305	-0.735166	0.4671

R-squared	0.415052	Mean dependent var	0.001671
Adjusted R-squared	0.381626	S.D. dependent var	0.196298
S.E. of regression	0.154362	Akaike info criterion	-0.823372
Sum squared resid	0.833970	Schwarz criterion	-0.694089
Log likelihood	18.64407	Hannan-Quinn criter.	-0.777374
F-statistic	12.41718	Durbin-Watson stat	2.045346
Prob(F-statistic)	0.000084		

LDD

Null Hypothesis: LDD has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.579026	0.8638
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Residual variance (no correction)	0.027139
HAC corrected variance (Bartlett kernel)	0.045396

Phillips-Perron Test Equation
Dependent Variable: D(LDD)
Method: Least Squares
Date: 01/14/22 Time: 13:57
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDD(-1)	-0.006410	0.010408	-0.615886	0.5417
C	0.233417	0.063330	3.685695	0.0007

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R-squared	0.010148	Mean dependent var	0.198159
Adjusted R-squared	-0.016605	S.D. dependent var	0.167747
S.E. of regression	0.169134	Akaike info criterion	-0.666332
Sum squared resid	1.058432	Schwarz criterion	-0.581021
Log likelihood	14.99348	Hannan-Quinn criter.	-0.635723
F-statistic	0.379316	Durbin-Watson stat	1.247729
Prob(F-statistic)	0.541740		

Null Hypothesis: LDD has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.335085	0.8640
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

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

Residual variance (no correction)	0.026744
HAC corrected variance (Bartlett kernel)	0.047572

Phillips-Perron Test Equation
Dependent Variable: D(LDD)
Method: Least Squares
Date: 01/14/22 Time: 14:04
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDD(-1)	-0.053961	0.066024	-0.817297	0.4191
C	0.272259	0.083052	3.278190	0.0023
@TREND("1981")	0.011135	0.015265	0.729445	0.4704

R-squared	0.024565	Mean dependent var	0.198159
Adjusted R-squared	-0.029626	S.D. dependent var	0.167747
S.E. of regression	0.170214	Akaike info criterion	-0.629722
Sum squared resid	1.043016	Schwarz criterion	-0.501756
Log likelihood	15.27958	Hannan-Quinn criter.	-0.583809
F-statistic	0.453305	Durbin-Watson stat	1.209484
Prob(F-statistic)	0.639102		

Null Hypothesis: LDD has a unit root

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Exogenous: None
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		3.294373	0.9996
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

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

Residual variance (no correction)	0.037103
HAC corrected variance (Bartlett kernel)	0.097598

Phillips-Perron Test Equation
Dependent Variable: D(LDD)
Method: Least Squares
Date: 01/14/22 Time: 14:05
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDD(-1)	0.028266	0.005135	5.504180	0.0000

R-squared	-0.353271	Mean dependent var	0.198159
Adjusted R-squared	-0.353271	S.D. dependent var	0.167747
S.E. of regression	0.195140	Akaike info criterion	-0.404890
Sum squared resid	1.447029	Schwarz criterion	-0.362235
Log likelihood	8.895355	Hannan-Quinn criter.	-0.389586
Durbin-Watson stat	0.940519		

Null Hypothesis: D(LDD) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.969804	0.0039
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Residual variance (no correction)	0.024188
HAC corrected variance (Bartlett kernel)	0.023976

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Phillips-Perron Test Equation
Dependent Variable: D(LDD,2)
Method: Least Squares
Date: 01/14/22 Time: 14:06
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDD(-1))	-0.637693	0.160290	-3.978358	0.0003
C	0.132597	0.040117	3.305271	0.0022

R-squared	0.305386	Mean dependent var	0.010787
Adjusted R-squared	0.286091	S.D. dependent var	0.189112
S.E. of regression	0.159786	Akaike info criterion	-0.778763
Sum squared resid	0.919140	Schwarz criterion	-0.692575
Log likelihood	16.79650	Hannan-Quinn criter.	-0.748098
F-statistic	15.82733	Durbin-Watson stat	1.908466
Prob(F-statistic)	0.000321		

Null Hypothesis: D(LDD) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.935998	0.0200
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Residual variance (no correction)	0.024067
HAC corrected variance (Bartlett kernel)	0.023794

Phillips-Perron Test Equation
Dependent Variable: D(LDD,2)
Method: Least Squares
Date: 01/14/22 Time: 14:07
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDD(-1))	-0.649067	0.164419	-3.947635	0.0004
C	0.155578	0.068269	2.278908	0.0289
@TREND("1981")	-0.001015	0.002425	-0.418624	0.6780

R-squared	0.308846	Mean dependent var	0.010787
Adjusted R-squared	0.269352	S.D. dependent var	0.189112
S.E. of regression	0.161649	Akaike info criterion	-0.731126
Sum squared resid	0.914560	Schwarz criterion	-0.601843
Log likelihood	16.89140	Hannan-Quinn criter.	-0.685128
F-statistic	7.819988	Durbin-Watson stat	1.898995

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Prob(F-statistic)	0.001558

Null Hypothesis: D(LDD) has a unit root
Exogenous: None
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.686092	0.0864
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

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

Residual variance (no correction)	0.031528
HAC corrected variance (Bartlett kernel)	0.023811

Phillips-Perron Test Equation
Dependent Variable: D(LDD,2)
Method: Least Squares
Date: 01/14/22 Time: 14:08
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDD(-1))	-0.233332	0.116635	-2.000538	0.0528

R-squared	0.094593	Mean dependent var	0.010787
Adjusted R-squared	0.094593	S.D. dependent var	0.189112
S.E. of regression	0.179945	Akaike info criterion	-0.566367
Sum squared resid	1.198068	Schwarz criterion	-0.523273
Log likelihood	11.76098	Hannan-Quinn criter.	-0.551035
Durbin-Watson stat	2.165346		

Null Hypothesis: LDD has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.579026	0.8638
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Residual variance (no correction)	0.027139

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HAC corrected variance (Bartlett kernel)	0.045396

Phillips-Perron Test Equation
Dependent Variable: D(LDD)
Method: Least Squares
Date: 01/14/22 Time: 13:57
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDD(-1)	-0.006410	0.010408	-0.615886	0.5417
C	0.233417	0.063330	3.685695	0.0007

R-squared	0.010148	Mean dependent var	0.198159
Adjusted R-squared	-0.016605	S.D. dependent var	0.167747
S.E. of regression	0.169134	Akaike info criterion	-0.666332
Sum squared resid	1.058432	Schwarz criterion	-0.581021
Log likelihood	14.99348	Hannan-Quinn criter.	-0.635723
F-statistic	0.379316	Durbin-Watson stat	1.247729
Prob(F-statistic)	0.541740		

Null Hypothesis: LDD has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.335085	0.8640
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

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

Residual variance (no correction)	0.026744
HAC corrected variance (Bartlett kernel)	0.047572

Phillips-Perron Test Equation
Dependent Variable: D(LDD)
Method: Least Squares
Date: 01/14/22 Time: 14:04
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDD(-1)	-0.053961	0.066024	-0.817297	0.4191
C	0.272259	0.083052	3.278190	0.0023
@TREND("1981")	0.011135	0.015265	0.729445	0.4704

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R-squared	0.024565	Mean dependent var	0.198159
Adjusted R-squared	-0.029626	S.D. dependent var	0.167747
S.E. of regression	0.170214	Akaike info criterion	-0.629722
Sum squared resid	1.043016	Schwarz criterion	-0.501756
Log likelihood	15.27958	Hannan-Quinn criter.	-0.583809
F-statistic	0.453305	Durbin-Watson stat	1.209484
Prob(F-statistic)	0.639102		

LLDR

Null Hypothesis: LLDR has a unit root
Exogenous: Constant
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.915502	0.0526
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Residual variance (no correction)	0.028395
HAC corrected variance (Bartlett kernel)	0.028395

Phillips-Perron Test Equation
Dependent Variable: D(LLDR)
Method: Least Squares
Date: 01/14/22 Time: 14:22
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLDR(-1)	-0.374093	0.128312	-2.915502	0.0060
C	1.563121	0.539003	2.900024	0.0062

R-squared	0.186816	Mean dependent var	-0.006266
Adjusted R-squared	0.164838	S.D. dependent var	0.189307
S.E. of regression	0.173002	Akaike info criterion	-0.621102
Sum squared resid	1.107404	Schwarz criterion	-0.535791
Log likelihood	14.11148	Hannan-Quinn criter.	-0.590493
F-statistic	8.500153	Durbin-Watson stat	1.717219
Prob(F-statistic)	0.005999		

Null Hypothesis: LLDR has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.030514	0.1373
Test critical values:	1% level	-4.211868	

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	5% level	-3.529758
	10% level	-3.196411

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

Residual variance (no correction)	0.027821
HAC corrected variance (Bartlett kernel)	0.027821

Phillips-Perron Test Equation
Dependent Variable: D(LLDR)
Method: Least Squares
Date: 01/14/22 Time: 14:24
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLDR(-1)	-0.406585	0.134164	-3.030514	0.0045
C	1.743803	0.580080	3.006143	0.0048
@TREND("1981")	-0.002218	0.002574	-0.861986	0.3944

R-squared	0.203260	Mean dependent var	-0.006266
Adjusted R-squared	0.158997	S.D. dependent var	0.189307
S.E. of regression	0.173606	Akaike info criterion	-0.590249
Sum squared resid	1.085010	Schwarz criterion	-0.462283
Log likelihood	14.50985	Hannan-Quinn criter.	-0.544336
F-statistic	4.592068	Durbin-Watson stat	1.701136
Prob(F-statistic)	0.016738		

Null Hypothesis: LLDR has a unit root
Exogenous: None
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.344162	0.5546
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

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

Residual variance (no correction)	0.034849
HAC corrected variance (Bartlett kernel)	0.034375

Phillips-Perron Test Equation
Dependent Variable: D(LLDR)
Method: Least Squares
Date: 01/14/22 Time: 14:26
Sample (adjusted): 1982 2020

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Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLDR(-1)	-0.002478	0.007209	-0.343701	0.7330

R-squared	0.001978	Mean dependent var	-0.006266
Adjusted R-squared	0.001978	S.D. dependent var	0.189307
S.E. of regression	0.189120	Akaike info criterion	-0.467566
Sum squared resid	1.359119	Schwarz criterion	-0.424911
Log likelihood	10.11754	Hannan-Quinn criter.	-0.452262
Durbin-Watson stat	2.013237		

LDIR

Null Hypothesis: LDIR has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.015649	0.7382
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Residual variance (no correction)	0.050825
HAC corrected variance (Bartlett kernel)	0.066104

Phillips-Perron Test Equation
Dependent Variable: D(LDIR)
Method: Least Squares
Date: 01/14/22 Time: 14:46
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDIR(-1)	-0.045775	0.053773	-0.851259	0.4001
C	0.064213	0.101174	0.634679	0.5295

R-squared	0.019209	Mean dependent var	-0.015925
Adjusted R-squared	-0.007299	S.D. dependent var	0.230618
S.E. of regression	0.231458	Akaike info criterion	-0.038918
Sum squared resid	1.982190	Schwarz criterion	0.046393
Log likelihood	2.758902	Hannan-Quinn criter.	-0.008309
F-statistic	0.724643	Durbin-Watson stat	1.817055
Prob(F-statistic)	0.400101		

Null Hypothesis: LDIR has a unit root

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Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.310623	0.4186
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

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

Residual variance (no correction)	0.045447
HAC corrected variance (Bartlett kernel)	0.062371

Phillips-Perron Test Equation
Dependent Variable: D(LDIR)
Method: Least Squares
Date: 01/14/22 Time: 14:48
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDIR(-1)	-0.171689	0.079868	-2.149659	0.0384
C	0.486559	0.226445	2.148684	0.0385
@TREND("1981")	-0.010096	0.004891	-2.064030	0.0463

R-squared	0.122993	Mean dependent var	-0.015925
Adjusted R-squared	0.074271	S.D. dependent var	0.230618
S.E. of regression	0.221888	Akaike info criterion	-0.099481
Sum squared resid	1.772441	Schwarz criterion	0.028485
Log likelihood	4.939879	Hannan-Quinn criter.	-0.053568
F-statistic	2.524357	Durbin-Watson stat	1.790865
Prob(F-statistic)	0.094200		

Null Hypothesis: LDIR has a unit root
Exogenous: None
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.725777	0.3957
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

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

Residual variance (no correction)	0.051379
HAC corrected variance (Bartlett kernel)	0.064308

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Phillips-Perron Test Equation
Dependent Variable: D(LDIR)
Method: Least Squares
Date: 01/14/22 Time: 14:49
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDIR(-1)	-0.014019	0.019543	-0.717313	0.4776

R-squared	0.008531	Mean dependent var	-0.015925
Adjusted R-squared	0.008531	S.D. dependent var	0.230618
S.E. of regression	0.229632	Akaike info criterion	-0.079372
Sum squared resid	2.003770	Schwarz criterion	-0.036717
Log likelihood	2.547753	Hannan-Quinn criter.	-0.064068
Durbin-Watson stat	1.855494		

Null Hypothesis: D(LDIR) has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.797831	0.0000
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Residual variance (no correction)	0.051531
HAC corrected variance (Bartlett kernel)	0.058316

Phillips-Perron Test Equation
Dependent Variable: D(LDIR,2)
Method: Least Squares
Date: 01/14/22 Time: 14:51
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDIR(-1))	-0.954240	0.165533	-5.764666	0.0000
C	-0.021713	0.037878	-0.573234	0.5701

R-squared	0.480005	Mean dependent var	-0.011212
Adjusted R-squared	0.465560	S.D. dependent var	0.319027
S.E. of regression	0.233226	Akaike info criterion	-0.022422
Sum squared resid	1.958197	Schwarz criterion	0.063767
Log likelihood	2.426018	Hannan-Quinn criter.	0.008243
F-statistic	33.23137	Durbin-Watson stat	1.995369
Prob(F-statistic)	0.000001		

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Null Hypothesis: D(LDIR) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.742010	0.0002
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Residual variance (no correction)	0.051373
HAC corrected variance (Bartlett kernel)	0.058553

Phillips-Perron Test Equation
Dependent Variable: D(LDIR,2)
Method: Least Squares
Date: 01/14/22 Time: 14:51
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDIR(-1))	-0.958041	0.168020	-5.701946	0.0000
C	0.001853	0.081283	0.022797	0.9819
@TREND("1981")	-0.001152	0.003502	-0.328838	0.7442

R-squared	0.481606	Mean dependent var	-0.011212
Adjusted R-squared	0.451984	S.D. dependent var	0.319027
S.E. of regression	0.236170	Akaike info criterion	0.027125
Sum squared resid	1.952165	Schwarz criterion	0.156408
Log likelihood	2.484629	Hannan-Quinn criter.	0.073123
F-statistic	16.25812	Durbin-Watson stat	1.993089
Prob(F-statistic)	0.000010		

Null Hypothesis: D(LDIR) has a unit root
Exogenous: None
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.834020	0.0000
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

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

Residual variance (no correction)	0.052002

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HAC corrected variance (Bartlett kernel)	0.059649

Phillips-Perron Test Equation
Dependent Variable: D(LDIR,2)
Method: Least Squares
Date: 01/14/22 Time: 14:53
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDIR(-1))	-0.949676	0.163834	-5.796578	0.0000

R-squared	0.475258	Mean dependent var	-0.011212
Adjusted R-squared	0.475258	S.D. dependent var	0.319027
S.E. of regression	0.231100	Akaike info criterion	-0.065967
Sum squared resid	1.976070	Schwarz criterion	-0.022873
Log likelihood	2.253379	Hannan-Quinn criter.	-0.050635
Durbin-Watson stat	1.987169		

LLIR

Null Hypothesis: LLIR has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.440834	0.0154
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Residual variance (no correction)	0.035242
HAC corrected variance (Bartlett kernel)	0.030752

Phillips-Perron Test Equation
Dependent Variable: D(LLIR)
Method: Least Squares
Date: 01/14/22 Time: 14:56
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLIR(-1)	-0.384635	0.110479	-3.481520	0.0013
C	1.100675	0.314254	3.502507	0.0012

R-squared	0.246758	Mean dependent var	0.011884
Adjusted R-squared	0.226400	S.D. dependent var	0.219130

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S.E. of regression	0.192735	Akaike info criterion	-0.405085
Sum squared resid	1.374425	Schwarz criterion	-0.319774
Log likelihood	9.899157	Hannan-Quinn criter.	-0.374476
F-statistic	12.12098	Durbin-Watson stat	2.306673
Prob(F-statistic)	0.001297		

Null Hypothesis: LLIR has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.990599	0.1423
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

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

Residual variance (no correction)	0.034951
HAC corrected variance (Bartlett kernel)	0.028321

Phillips-Perron Test Equation
Dependent Variable: D(LLIR)
Method: Least Squares
Date: 01/14/22 Time: 14:57
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLIR(-1)	-0.364742	0.117318	-3.108988	0.0037
C	1.076223	0.320406	3.358938	0.0019
@TREND("1981")	-0.001593	0.002912	-0.547043	0.5877

R-squared	0.252968	Mean dependent var	0.011884
Adjusted R-squared	0.211466	S.D. dependent var	0.219130
S.E. of regression	0.194586	Akaike info criterion	-0.362081
Sum squared resid	1.363094	Schwarz criterion	-0.234115
Log likelihood	10.06058	Hannan-Quinn criter.	-0.316168
F-statistic	6.095339	Durbin-Watson stat	2.375424
Prob(F-statistic)	0.005249		

Null Hypothesis: LLIR has a unit root
Exogenous: None
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.162291	0.7277
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

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

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Residual variance (no correction)	0.046926
HAC corrected variance (Bartlett kernel)	0.028935

Phillips-Perron Test Equation
Dependent Variable: D(LLIR)
Method: Least Squares
Date: 01/14/22 Time: 14:59
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLIR(-1)	0.000448	0.012354	0.036264	0.9713

R-squared	-0.002984	Mean dependent var	0.011884
Adjusted R-squared	-0.002984	S.D. dependent var	0.219130
S.E. of regression	0.219456	Akaike info criterion	-0.170019
Sum squared resid	1.830123	Schwarz criterion	-0.127364
Log likelihood	4.315374	Hannan-Quinn criter.	-0.154715
Durbin-Watson stat	2.591278		

3. COINTEGRATION

ARDL Bounds Test
Date: 01/14/22 Time: 17:29
Sample: 1983 2020
Included observations: 38
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	2.829206	5

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Test Equation:
Dependent Variable: D(LMNOUT)
Method: Least Squares
Date: 01/14/22 Time: 17:29
Sample: 1983 2020
Included observations: 38

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDD)	0.148631	0.125442	1.184853	0.2460

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D(LDD(-1))	-0.369053	0.136195	-2.709739	0.0114
D(LLIR)	0.165377	0.090431	1.828773	0.0781
C	11.03774	3.896712	2.832577	0.0085
LDMBCMS(-1)	-0.179823	0.090168	-1.994305	0.0559
LDD(-1)	0.195689	0.091177	2.146254	0.0407
LLDR(-1)	-0.094052	0.084500	-1.113036	0.2752
LDIR(-1)	0.056355	0.072086	0.781771	0.4409
LLIR(-1)	0.051794	0.105631	0.490329	0.6277
LMNOUT(-1)	-0.253889	0.096797	-2.622904	0.0139

R-squared	0.412508	Mean dependent var	0.006127
Adjusted R-squared	0.223672	S.D. dependent var	0.111857
S.E. of regression	0.098557	Akaike info criterion	-1.575437
Sum squared resid	0.271975	Schwarz criterion	-1.144493
Log likelihood	39.93330	Hannan-Quinn criter.	-1.422110
F-statistic	2.184473	Durbin-Watson stat	1.725165
Prob(F-statistic)	0.055044		

4. ARDL

Dependent Variable: LMNOUT
Method: ARDL
Date: 01/15/22 Time: 08:31
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): LDMBCMS LDD LLDR LDIR LLIR
Fixed regressors: C
Number of models evalulated: 243
Selected Model: ARDL(1, 0, 2, 0, 0, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LMNOUT(-1)	0.689237	0.109541	6.292053	0.0000
LDMBCMS	-0.171294	0.085520	-2.002967	0.0549
LDD	0.165927	0.121895	1.361235	0.1843
LDD(-1)	-0.208129	0.175966	-1.182779	0.2468
LDD(-2)	0.251200	0.116058	2.164440	0.0391
LLDR	-0.163030	0.088166	-1.849136	0.0750
LDIR	0.134741	0.084895	1.587135	0.1237
LLIR	0.090031	0.096831	0.929774	0.3604
LLIR(-1)	-0.139348	0.107747	-1.293290	0.2065
C	12.84245	4.108421	3.125885	0.0041

R-squared	0.914884	Mean dependent var	29.00063
Adjusted R-squared	0.887526	S.D. dependent var	0.278892
S.E. of regression	0.093533	Akaike info criterion	-1.680078
Sum squared resid	0.244954	Schwarz criterion	-1.249134
Log likelihood	41.92148	Hannan-Quinn criter.	-1.526751
F-statistic	33.44045	Durbin-Watson stat	1.724064
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Cointegrating And Long Run Form
Dependent Variable: LMNOUT

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Selected Model: ARDL(1, 0, 2, 0, 0, 1)
Date: 01/15/22 Time: 08:34
Sample: 1981 2020
Included observations: 38

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDMBCMS)	-0.171294	0.085520	-2.002967	0.0549
D(LDD)	0.165927	0.121895	1.361235	0.1843
D(LDD(-1))	-0.251200	0.116058	-2.164440	0.0391
D(LLDR)	-0.163030	0.088166	-1.849136	0.0750
D(LDIR)	0.134741	0.084895	1.587135	0.1237
D(LLIR)	0.090031	0.096831	0.929774	0.3604
CointEq(-1)	-0.310763	0.109541	-2.836965	0.0084

Cointeq = LMNOUT - (-0.5512*LDMBCMS + 0.6725*LDD -0.5246*LLDR + 0.4336*LDIR -0.4216*LLIR + 41.3255)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDMBCMS	-0.551203	0.269751	-2.043379	0.0505
LDD	0.672534	0.252260	2.666029	0.0126
LLDR	-0.524612	0.312792	-1.677188	0.1046
LDIR	0.433579	0.185816	2.333381	0.0270
LLIR	-0.421570	0.200281	-2.104890	0.0570
C	41.325484	5.200680	7.946170	0.0000

Residual Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.379388	Prob. F(1,27)	0.5431
Obs*R-squared	0.526554	Prob. Chi-Square(1)	0.4681

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 01/16/22 Time: 15:37
Sample: 1983 2020
Included observations: 38
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMNOUT(-1)	-0.036718	0.125796	-0.291881	0.7726
LDMBCMS	-0.009600	0.087877	-0.109242	0.9138
LDD	0.013079	0.125084	0.104559	0.9175
LDD(-1)	-0.018078	0.180353	-0.100235	0.9209
LDD(-2)	0.019269	0.121464	0.158641	0.8751

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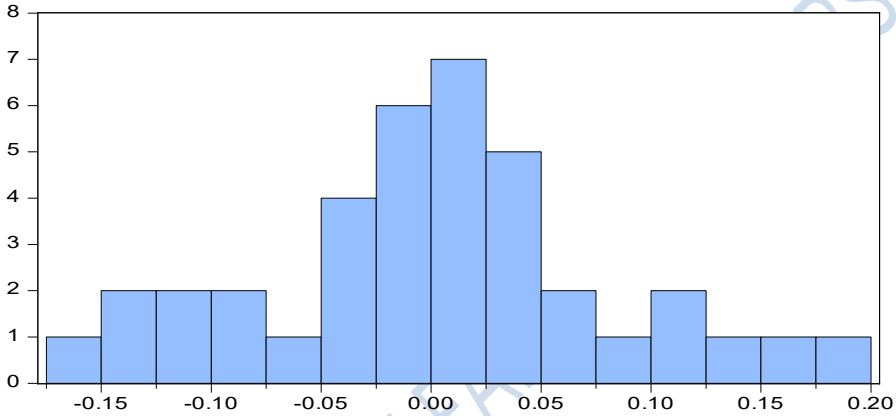
LLDR	-0.001117	0.089178	-0.012531	0.9901
LDIR	0.017404	0.090382	0.192555	0.8487
LLIR	-0.024913	0.105947	-0.235145	0.8159
LLIR(-1)	0.003194	0.109085	0.029281	0.9769
C	1.268474	4.637115	0.273548	0.7865
RESID(-1)	0.142941	0.232069	0.615945	0.5431

R-squared	0.013857	Mean dependent var	1.03E-14
Adjusted R-squared	-0.351382	S.D. dependent var	0.081366
S.E. of regression	0.094587	Akaike info criterion	-1.641400
Sum squared resid	0.241560	Schwarz criterion	-1.167362
Log likelihood	42.18660	Hannan-Quinn criter.	-1.472741
F-statistic	0.037939	Durbin-Watson stat	1.882648
Prob(F-statistic)	0.999997		

Jarque-Bera Normality Test



Series: Residuals
Sample 1983 2020
Observations 38

Mean	1.03e-14
Median	0.003622
Maximum	0.184465
Minimum	-0.158941
Std. Dev.	0.081366
Skewness	0.175464
Kurtosis	2.900266
Jarque-Bera	0.210739
Probability	0.899992

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Heteroskedasticity Test

Heteroskedasticity Test: ARCH

F-statistic	0.086315	Prob. F(1,35)	0.7707
Obs*R-squared	0.091023	Prob. Chi-Square(1)	0.7629

Test Equation:
Dependent Variable: RESID^2

Method: Least Squares
Date: 01/16/22 Time: 15:49
Sample (adjusted): 1984 2020
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.006409	0.001833	3.497388	0.0013
RESID^2(-1)	-0.048397	0.164730	-0.293794	0.7707

R-squared	0.002460	Mean dependent var	0.006090
Adjusted R-squared	-0.026041	S.D. dependent var	0.008853
S.E. of regression	0.008968	Akaike info criterion	-6.537786
Sum squared resid	0.002815	Schwarz criterion	-6.450709
Log likelihood	122.9490	Hannan-Quinn criter.	-6.507087
F-statistic	0.086315	Durbin-Watson stat	1.943988
Prob(F-statistic)	0.770650		

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Biodata

A. Personal Data

Full Name: FATOLA OPEYEMI AKINDELE

Address: Wasinmi, Along Itori Road, Ewekoro, Ogun State, Nigeria

E-mail: fatolaopeyemi@gmail.com

Phone No: +2347065524064

Date of Birth: 07th of January, 1990

Nationality: Nigerian

Next of Kin: FATOLA TOLULOPE PRECIOUS

No. 4, Zone E, Onifila Area, Dizengoff, Iwo-Road, Ibadan, Oyo State

B. Educational Background

Educational Institutes Attended with dates and QUalifications

- M. Sc. in Finance
  Lead City University, Ibadan **(i**n view)
- Diploma in Data Analytics)
  Edgeford Business School (2022)
- B. Sc. Economics
  Federal University of Agriculture, Abeokuta (FUNAAB) (2019)
- Economics Remote Course
  Stanford University, California
  (2019)

C. Working Experience with Dates

- Owu College of Management Sciences, Wasinmi, Ogun State January 2022 - Present
  Lecturer
- Integrated Project, Risk and Management Institute (IPRM) July 2021 - Present
  Ogun State Coordinator/ Facilitator
- Knowledgepool Consulting Limited, Ibadan September 2020 – August 2021
  Administrative Associate
- Federal Polytechnic Idah, Kogi State August 2019 – August 2020
  Graduate Assistant Lecturer
- Skytex Systems Limited, Ibadan 2016 – 2019
  Customer Care Representative
- Christus Montessori School / Olive Towers Academy 2008 - 2014
  Educator

D. Membership of Academic and Professional Bodies

- Associate, Formazionne Business School (HRMP, CSRMP, HSE)

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- Associate, Institute of Strategic Management, Nigeria

_____ _____

Signature **Date**

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