

**The Relationship between Foreign Direct  
Investment, Exchange Rate, and Broad Money  
Growth: The case of Nigeria**

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## ABSTRACT

The thesis investigates the long-run equilibrium relationship between foreign direct investment, exchange rate, and broad money growth in the case of Nigeria with the use of data sourced from the World Bank Development Indicators from 1970 to 2016. The thesis applies the two unit root tests namely Augmented Dickey-Fuller and Phillips–Perron in order to test the stationarity of the variables with Kwiatkowski–Phillips–Schmidt–Shin stationarity test as a confirmatory test. Vector autoregressive model (VAR) is applied along with Johansen cointegration test and vector error correction model (VECM) with the aim of estimating the long-run coefficients and determining the existence of a long-run association between the variables. Granger causality test is further applied to determine the directions of the variables and lastly, Impulse Response Function and Variance Decomposition are applied to see the variables' response to an exogenous shock. The results indicate a positive long-run relationship between FDI and broad money growth as well as a negative long-run relationship between exchange rate and broad money growth in Nigeria. The thesis recommends policymakers to adopt a suitable exchange rate regime other than the floating or flexible regime, target inflation with monetary policy and narrow down the gap that exists between inter-bank and parallel market foreign exchange rate. Furthermore, local production, as well as exports, need to be boosted and imports should be reduced by levying more tax on luxury imports. There should also be a provision of foreign exchange futures for investors in order to stimulate foreign investment.

**Keywords:** Broad money growth, Foreign Direct Investment, Exchange rate

## ÖZ

Bu tez, Dünya Kalkınma Bankasından 1970 ve 2016 yılları arasında elde edilen veriler kullanılarak, Nijerya’da doğrudan yabancı yatırım, döviz kurları ve geniş para büyümesi arandaki uzun vadeli dengeilişkisini incelemektedir. Bu tezde değişkenlerin durağanlığını test edebilmek için Augmented Dickey-Fuller, Phillips-Perron ve Kwiatkowski-Phillips-Schmidt – Shin durağanlık testi olmak üzere üç birim kök testi uygulanmıştır. Ayrıca değişkenlerin uzun vadeli katsayılarını tahmin etmek için Vektör hata düzeltme modeli (VECM) kullanılmıştır. Granger nedensellik testi ise değişkenler arasındaki ilişkilerin yönünü belirlemek için kullanılmıştır. Son olarak, dürtü yanıt fonksiyonu ve değişken ayrıştırma yöntemleri, değişkenin dış şoklara vereceği tepkileri inceleyebilmek için kullanılmıştır. Sonuçlar, Nijerya’da doğrudan yabancı yatırım ve geniş para büyümesi ile uzun vadede olumlu; fakat döviz kurları ve geniş para büyümesi ile uzun vadede negatif bir ilişki olduğunu göstermiştir. Bu tez, politikacıların dalgalı ve esnek bir rejimden çok uygun bir döviz kuru rejimi benimsemesini, para politikasıyla enflasyonun kontrol altına alınıp bankalar arası ve paralel piyasa döviz kuru arasındaki boşluğun daraltılmasını, ithalatın önemli ölçüde azaltılarak yerel üretimin desteklenmesini ve ihracata hız verilmesini önermektedir.

**Anahtar Kelimeler:** Geniş para büyüme, Doğrudan Yabancı Yatırım, Döviz Kurları

## **DEDICATION**

To my amazing and lovely nephews and nieces.  
Saadiq, Khalifah, Khalil, Manal, Anwar, Amal and Nawal  
(May Her Gentle Soul Rest in Peace).

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## **LIST OF ABBREVIATIONS**

ADF	Augmented Dickey-Fuller Test
AIC	Akaike Information Criteria
ARDL	Autoregressive Distributed Lag
AU	African Union
CBN	Central Bank of Nigeria
ECT	Error Correction Term
ECOWAS	Economic Community of West African States
GMM	Generalized Method of Moments
FPE	Final Prediction Error
GDP	Gross Domestic Product
HQ	Hannan - Quinn Information Criteria
KPSS	Kwiatkowski – Phillips – Schmidt – Shin
PP	Phillips – Perron Test
PPP	Purchasing Power Parity
SC	Schwarz Information Criterion
SAP	Structural Adjustment Program
USA	United States of America
VAR	Vector Autoregressive Model
VECM	Vector Error Correction Model

# Chapter 1

## INTRODUCTION

Money plays a very important role in the global economy. As Friedman (1963) said, money-related issues exist everywhere and these issues are basically a global monetary phenomenon, therefore the behavior of money holdings by households and firms should be an area of interest. Broad money is a measure of a nation's cash supply and it incorporates any type of cash and bank money (deposits in commercial banks) being held in bank accounts that are known to be easily accessible. Broad money comprises of highly liquid financial items and items that are not necessarily cash but can be rapidly converted into cash with ease (Sprenkle & Miller, 1980).

According to the Central Bank of Nigeria (CBN, 2016), exchange rate refers to the price for which a currency can be exchanged for another currency. It is represented as the amount to be paid in a domestic currency for the purchase of a single unit of a foreign currency. Imports and exports are an integral part of an economy and exchange rate dynamics impact the prices of imported and exported goods thereby enabling exchange rate to play an important role in the economy. Meese and Rose (1991) stated that exchange rate is determined by factors such as demand, supply and the general state of the economy, especially in a floating exchange rate regime. The foreign reserve of a country increases when the country exports more than it imports and this enables the value of the domestic currency to appreciate. Consequently, in a situation where a country's imports transcend its exports, it is likely the domestic

currency will depreciate. Weale et al. (2015) stated that investors from foreign countries can benefit from inflation and high interest rates as they cause fluctuations in exchange rate. If there is an increase in the inflow of foreign currencies, the domestic currency will appreciate but this appreciation can, in turn, make imports less costly than exports. Also when there is a fall in interest rates, foreigners aim at transferring their money out of the domestic country and hence, the domestic currency will depreciate. Furthermore, high inflation leads to an increase in imports in the domestic economy and this will drain the country's foreign reserve and in turn, the domestic currency will depreciate. Das (2013) contended that the bubble in 2007 which was as a result of the housing prices in the United States, prompted the most exceedingly awful worldwide financial and economic-related crisis until the year 2009. This crisis pressured a lot of African countries and also some Asian countries into depreciation.

Exchange rate is very important because, in order for a country to partake in trade globally, foreign exchange is required. Conway (2016) classified currencies into two namely convertible and nonconvertible. Convertible currencies are currencies that are accepted for international transactions, for example, the United States dollar, while nonconvertible currencies are owned by countries that have to purchase foreign currency for international transactions. For countries with nonconvertible currencies, utilization of foreign exchange is paramount in order to fund foreign reserves, settle debts, invest internationally and manage monetary policy. Residents of a country also need foreign exchange in order to carry out international transactions, remittances and fund domiciliary accounts.

Guzman et al. (2018) mentioned two main issues associated with exchange rate policies in developing countries and they are i) the part exchange rate plays in improving or obstructing economic development, and ii) how exchange rate regimes and management of capital account assist in maintaining swings in external financing and fluctuations in trade. The first issue emphasizes economic diversification in the development of emerging economies and the attribution of dynamic growth to adequate technological advancements. The second issue centers around the fact that capital flows strengthen commodity prices and pro-cyclical capital inflows in developing countries determine the cycle of business.

Srivastava (2003) defined foreign direct investment (FDI) as an international investment by a foreign investor with the aim of getting a lasting interest and dominance over a particular business in a foreign country. The term lasting interest refers to a long-run relationship between an investor and a business with an amount of influence on the activities of the business. FDI flows majorly comprise of reinvested earnings, debt transactions and equity and they are recorded on a net basis in the balance of payments (Guris, 2012; Kalim et al., 2012; Taspinar, 2014).

The importance of FDI varies across host countries and aspects of the investment itself (Katircioglu, 2011; 2009). The investment could be in the services or manufacturing sector and it could be a sequential or new venture. Noorbakhsh et al. (2001) mentioned that due to the fall in the flows of official and private capital, FDI became a good way to acquire funds. Also, FDI is important in developing countries because it provides jobs, technology, managerial and organizational skills as well as access to markets globally (Katircioglu & Naraliyeva, 2006). Sengupta and Puri (2018) investigated the current trend of FDI among selected developing countries

and it was discovered that the difference in the quantum of the flow is explained by the various economic policies of the countries and there is a positive relationship between FDI and economic growth in all countries. Furthermore, Li and Resnick (2003) stated that FDI has faced certain drawbacks, especially in developing countries, because it can either be promoted or jeopardized by democracy. Li and Resnick (2003) also argued that democratic administrations disrupt FDI inflows by restricting multinational businesses, smoothening local businesses quest for prevention of foreign capital and limiting hosts governments potential to attract foreign investors.

The Nigerian economy is one of the largest in Africa and its main source of revenue is the petroleum industry since the 1970's. The focus given to the petroleum industry by the Nigerian government has resulted in the decline of so many other sectors like agriculture (Britannica, 2018). Nigeria had an unstable flow of revenue in the 2000's and the then government tried to remedy the problem by introducing austerity measures and acquiring foreign loans. As a result of this, the country's foreign reserve has depleted and a huge percentage of the national budget is for loan repayment (Britannica, 2018).

Economic rigidity has been an impediment in achieving a freely floating exchange rate in Nigeria. The Nigerian economy for many years has been dependent on imports and this pressurized the demand for foreign exchange and hence making foreign exchange rates extremely volatile. In the year 2015 to mid-2016, the volatility in exchange rate brought Nigeria down to its knees. Supply rigidity has also been an issue in the Nigerian economy as proceeds from export products that are not oil related are barely restituted back into the economy. The procedures to be

followed in order to purchase foreign currency at official rates as stipulated by the Central Bank of Nigeria (CBN) are inconvenient and unreasonable. This leaves individuals with no choice but to patronize parallel markets and this tends to be a bridge with regards to the supply of money in the economy. Also, the Nigerian government has recently been trying to push agendas that will aid in attracting FDI with the belief that it will help in resolving some of the monetary issues of the country.

The main aim of this thesis is basically to examine the relationship between foreign direct investment, exchange rate, and broad money in the Nigerian economy from 1970 to 2016 and also to recommend suitable policies for regulatory bodies. Past literature targeted the causal relationship between money supply, inflation, and interest rates. A lot of research on money supply has been carried out previously but none of them has addressed the relationship between broad money, exchange rate, and FDI. It will be determined if there is a long-term relationship and also a causal relationship between the three macroeconomic factors. The thesis contributes to the literature by covering up the gap that exists in the literature. There is hardly any study that investigates the impact of the variables used in this thesis on broad money growth for the case of Nigeria also no previous study covers the same time range. The limitation faced by the thesis is the challenge of finding similar studies with broad money growth as the dependent variable for reference and because of this, the thesis contributes by aiding future research and studies.

The thesis constitutes time series methodology and it is made up of the following procedures which are unit root tests which include ADF, PP and KPSS stationarity test. The second procedure is vector autoregressive model (VAR) which will cover



the lag length criteria and diagnostic tests. Thirdly is the Johansen Co-integration test to determine the long-run relationship of the variables, fourthly is vector error correction mechanism (VECM) which will cover the speed of adjustment and long-run coefficients, and lastly is Granger Causality test, Impulse Response Function and Variance Decomposition.

The thesis consists of six chapters and the second chapter is made up of previous similar studies and research conducted. It examines relevant past literature and recommended policies. Chapter 3 gives background information with regards to the Nigerian economy, broad money, exchange rate, and FDI. Chapter 4 will cover the methodology of the thesis while Chapter 5 will explain the empirical findings obtained via econometric processes. Finally, Chapter 6 will conclude the thesis by analyzing the results and giving policy recommendations.

## **Chapter 2**

### **EMPIRICAL STUDIES AND THEORIES**

#### **2.1 Foreign Direct Investment and Broad Money Growth**

Broad money, money supply, and FDI have a relationship that has been widely investigated in the past literature (Kurtovic et al., 2014). FDI has been a major means of survival for some developed and developing countries across the world.

Omuorah and Nnenna (2013) found it preeminent to explore the determinants of FDI performance by investigating the long-term relationship between FDI and certain macroeconomic variables in Nigeria which include money supply. The research used data of 30 years from 1980 to 2010 and unit root and co-integration tests were performed before analyzing the data using VAR and Impulse Response Function. The result proved a strong negative relationship between economic growth and FDI and it also showed that FDI is strongly and directly impacted by the money supply. In terms of the impulse function, the reaction of FDI to money supply was positive initially and consequently became negative. Omuorah et al. (2013) recommended that the Nigerian government should particularly pay attention to policies with regards inflation, interest rate, and money supply in order to attract FDI and it is also finalized that FDI is sustained in an economy where the money supply is regulated.

Shafiq et al. (2015) utilized the Generalized Method of Moments (GMM) and established that the coefficient of GDP and Money Supply (M1) is emphatically

significant on FDI in the case of Pakistan. Inaccessibility of certainties for the diverse basic determinants like companies and labor prices alongside genuine physical facilities can be regarded as restrictions. The recommendation given for future academic research by the authors is that finding data in a stable political arena may be seen as an upgrade.

Oladipo (2013) used data from 1985 to 2010 to investigate money supply as a determinant of FDI in Nigeria with the use of Generalized Method of Moment and the results from the GMM show that money supply determines FDI at a 5 percent significance level whereby the impact money supply has on FDI is very strong as the coefficient of money supply is 2.83 percent.

## **2.2 Exchange Rate and Broad Money Growth**

In 1963, Nobel Prize winner Mundell established himself as the first to portray the importance of exchange rate in money demand and supply although he could not provide empirical evidence on the exchange rate. Dating back to 1997, Levin (1997) reinvestigated the matter of the dynamics of exchange rate in a situation where the United States central bank implements policies that will impact the growth of broad money. An initial analysis done by Levin (1997) in terms of the dynamics of exchange rate suggested that the growth rate of broad money was zero and the financial regulatory body adjusted money stock permanently. The reinvestigation by Levin (1997) was done based on a Dornbusch model and it is discovered that broad money growth causes the exchange rate to undershoot or overshoot.

Ghumro & Karim (2016) stated that the dynamics of exchange rate greatly impacts the purchasing power parity (PPP) of households and they further investigated the

short-term as well as long-term impacts of exchange rate on broad money demand in the case of Pakistan with the use of data from 1972 to 2014. In order to examine this, Ghumro et al. (2016) used Autoregressive Distributed Lag (ARDL) to investigate the long as well as short run effects and the result show that in both short and long run, the exchange rate positively impacts real broad money demand. They discovered that exchange rate assists in terms of the stability of the model and their recommendation is to implement broad money as a tool for monitoring monetary policy in Pakistan.

Arango and Nadiri (1981) proposed that in a case where the domestic currency depreciates or foreign currency appreciates due to the behavior of exchange rate, the value of foreign assets increase, and this will generate an improvement in the cash balances demand and wealth of a country. Agenor and Khan (1996) suggested that both foreign and domestic currency in certain portfolio's lean towards the role of the foreign exchange rate variable.

Owolabi and Adegbite (2014) investigated the impact of foreign exchange and broad money on the economy of Nigeria using data from the Central Bank of Nigeria from 1988 to 2010. It was discovered that broad money, exchange rate and also interest rates are all significant and the result of the study proved growth in broad money is as a result of credits received by the private sector from banks which in turn suggests the recommendation that the Nigerian government must establish credible financial intermediation and work towards establishing stability in prices.

### **2.3 Exchange Rate and Foreign Direct Investment**

According to Goldberg (2009), FDI refers to capital inflows from international sources while exchange rate is the price of a foreign currency in terms of the

domestic currency. It is widely suggested that FDI is influenced by the dynamics of the exchange rate. When the value of a domestic currency depreciates, it has a number of effects on FDI such as a drop in the wages and production costs of the country (Goldberg, 2009).

Blonigen (1997) initiates a different reasoning which is firm-specific to back the role played by exchange rate dynamics in impacting FDI and this is because of the fact that firms both foreign and domestic pay with the same currency. Consequently, gains and profits can be gotten from firm-specific assets due to different opportunities in generating profits in foreign markets. According to Froot and Stein (1991), there are certain discolorations in terms of globally integrated markets because external financing costs more than internal financing and the devaluation of a domestic currency can cause domestic assets to be acquired by foreign entities.

Lily et al. (2014) examined the relationship between foreign direct investment and exchange rate movements with the use of annual data from ASEAN economies, i.e. Singapore, Malaysia, Thailand, and the Philippines. It is further stated that inflows of FDI are of great importance to the development of nations and consequently the market for FDI is becoming more competitive on a daily basis. The results showed that there is co-integration between FDI and exchange rate in three of the ASEAN countries, namely the Philippines, Malaysia, and Singapore. The causality test shows a bidirectional causality between FDI and exchange rate in Singapore and the Philippines, while a unidirectional causal relationship exists between FDI and exchange rate in Malaysia.

In the case of a developing economy like Kenya, Njuguna (2016) concluded that an increase in exchange rates will lead to an increase in FDI and this asserts a positive relationship. The model shows that the exchange rate is 94.3 percent correlated with the dependent variable which means it is a predictor of FDI.

Cambazoglu and Gunes (2016) examined the long-run relationship between FDI and exchange rate in Turkey by using the ARDL approach. The model showed that there is co-integration between exchange rate and FDI which means that a long-term relationship between the variables exists in Turkey.

Chen et al. (2016) used a panel to investigate the inflow of FDI in China from Taiwan and it was discovered that the dynamic and volatile nature of the exchange rate has an effect on the FDI from Taiwanese corporations. Therefore, it is concluded that the relationship between FDI and the exchange rate is heavily reliant on the activities and operations of the corporations.

Furthermore, if the case of Korea is examined, Lee (2015) made certain discoveries and they include the fact there is a long-run and short run causal relationship between exchange rate and FDI, and also the FDI in Korea has experienced a structural break due to the 2007/2008 financial crisis.

## **Chapter 3**

# **FOREIGN DIRECT INVESTMENT, EXCHANGE RATE, AND BROAD MONEY IN THE NIGERIAN ECONOMY**

### **3.1 The Federal Republic of Nigeria**

The Federal Republic of Nigeria is a West African country on the Gulf of Guinea bordered by Niger, Cameroon, Chad, and Benin and it overlays a land floor region of 910,770 Km<sup>2</sup> (351,650 sq. miles). It is known to be Africa's most populous nation, with approximately a population of 196 million (Britannica, 2018). Nigeria became independent of British rule in 1960 in it turned into a federation of 3 regions that were self-governed by the indigenous people namely Northern, Western, and Eastern regions. In 1963, Nigeria became a Federal Republic, with a fourth region (the Midwest), and a new constitution. Nigeria has a total GDP of \$1.118 trillion and also \$5929 GDP (PPP) per capita and it is included in the "Next Eleven" list which contains a number of countries with the potential of having the biggest economy in the room. Nigeria is part of several international organizations such as the African Union (AU), Economic Community of West African States (ECOWAS), Commonwealth of Nations and many others.

One of the pivotal features of Nigeria's development drive is the growth in the financial sector. Take the seventies as example, at the time due to the economic paradigm, the country operated under so many regulations imposed by the government whereby the government was control of all monetary affairs especially

in the banking sector, but in 1986 Structural Adjustment Programme (SAP) made it its primary objective to liberalize the banking enterprise and drive the economic system to prosperity from austerity (Ndako, 2017).

As part of the extensive economic measure to respond to the destructive consequences of the global economic and financial crisis, in 2009 CBN alongside the monetary authorities engineered measures to ward off the collapse of the financial system to maintain economic growth (Nkemakolam, 2018).

### **3.2 Effect of Broad Money on the Nigerian Economy**

The money-making exercises of the deposit banks affect broad money and also since the central bank is in charge of controlling the money supply in an economy, it is critical to assess the banking sectors position on the merging procedure (West African Monetary Agency (WAMA), (2009)). Aslem (1989) reviewed that broad money supply is the aggregate sum of money (such as demand deposits and currency) available for use in a nation at any given time. The currency in circulation comprises of notes and coins, while current account or demand deposits are those commitments that are not related to any type of interest payment and are acknowledged by the general public as a method of exchange drawn with no notice by means of cheque. The stock of cash can be estimated or measured at any given time in an economy. Broad money supply can be measured using two criteria. The principal criteria characterize the stock of narrow money (for the most part assigned by M1) as coins and currencies available for use in the hands of the non-banking general public and the demand deposit with commercial banks (Ajakaiye, 1995).

Asogu (1998) analyzed the impact of broad money supply and government expenditure on Gross Domestic Product (GDP). He embraced the St Louis model on



yearly and quarterly time arrangement data from 1960-1995 and as a result, it was discovered that export and broad money supply are very important. The outcome showed that unexpected growth in money would affect output positively. A lucid examination of the outcome demonstrates that there is no general concession on the determinant of economic growth in the Nigerian economy. Asogu (1998) demonstrated that there is an explicit connection between economic growth and money. During the late 1970's and the early 1980's various central banks in the world embraced monetary targets as a guide for monetary policy. Monetary targeting is an effort by the central bank to portray or decide the ideal money stock that will yield the coveted objectives of macroeconomics.

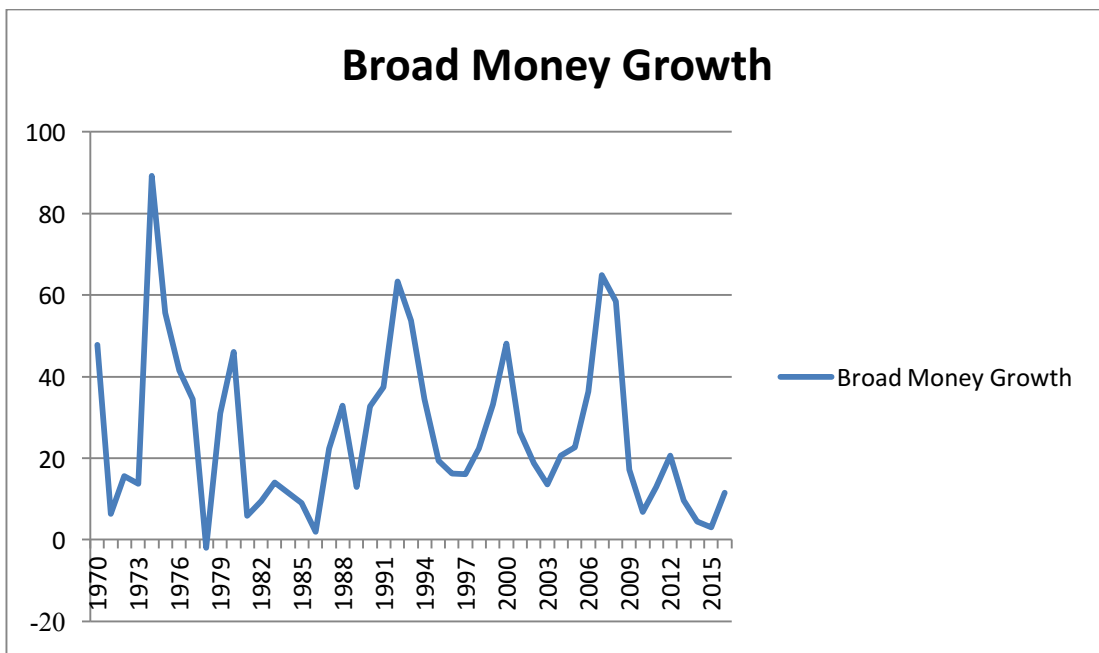


Figure 1: Broad Money Growth (Annual %).  
Source: World Development Indicators

Figure 1 shows the volatility of broad money growth with its peak between 1975 and 1976. As of 1978, broad money was negative but it came up in 1979 and then experienced a rapid decline from 1977 to 1978 due to some reasons, and one of them

could be the occurrence of certain political events such as military coups. From 2014 to 2015 broad money growth was also at a record low as a result of the recession experienced in Nigeria.

### **3.3 Impact of Foreign Exchange Rate in Nigeria**

In Nigeria, exchange rates were basically fixed before SAP was implemented in 1986, and it is common knowledge that exchange rates are dictated by the forces of demand and supply (Umeora, 2010). Also with regards to the exchange rate in Nigeria, Umeora (2010) stated that the parallel market, which is popularly referred to as black market, thrived as a result of the ridiculous increase in the demand of foreign exchange with supply was falling short at the time. SFEM was established in order to utilize market forces to create a standard exchange rate for the Naira. Furthermore, the Nigerian government created the Bureaux De Change in 1989 as a means to expand the foreign exchange market and allot foreign currency that has been sourced privately. Aliyu (2009) stated that sudden adjustments in exchange rates impacted the choices made by risk-averse commodity investors in such a way that output and trade volumes would be reduced as a result. Consequently, according to Hesabi (2017), assuming that the price of imports is denominated in overseas currency and that businesses know in advance their level of income for any given exchange rate value, uncertainty about the exchange rate does not have an effect on the level of trade but does determine the level of forward cover taken. It is very unlikely that a business or corporation might own such profit facts.

Fatai & Akinbobola (2015) stated that the non-stop depreciation on the naira exchange rate contributed to a continuous rise in prices of goods and services. It is additionally stated that those contributions appear to be greater in the short-run than

in the medium time period due to the fact different policies inclusive of those on petroleum expenses evaluate interest rates on loans and prices of imported products. Additionally, it was discovered that costs rose as a result of the plummeting exchange rate and increase in prices range throughout the region such that exchange rate depreciation can set off relative prices modifications.

Figure 2 shows that the price of foreign currency is stable up to 1997 and as of 1998, it keeps heading up and the graph shows how the exchange rate went up when the country plummeted into recession in 2015.

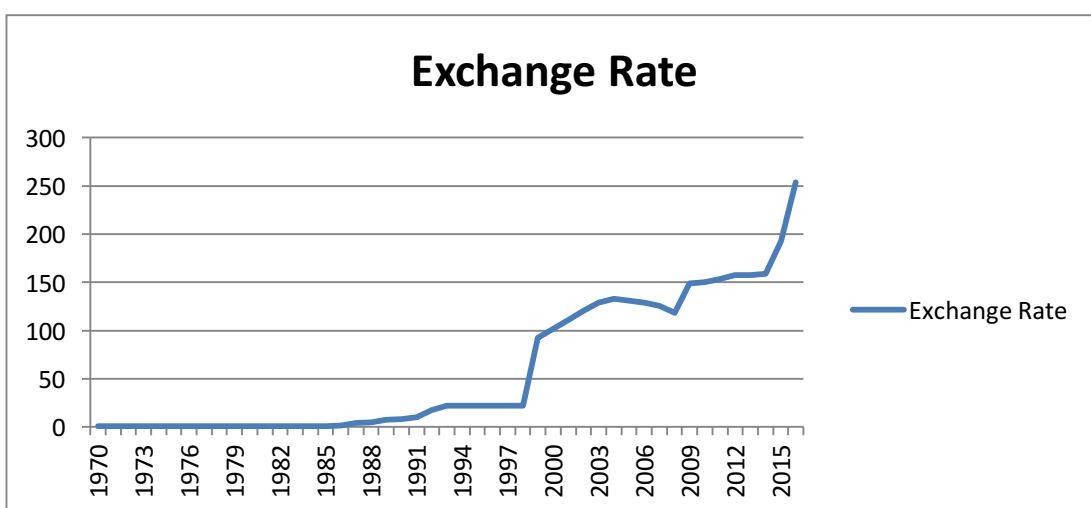


Figure 2: Official Exchange Rate (LCU).  
Source: World Development Indicators

### 3.4 Foreign Direct Investment in Nigeria

A lot of countries aim at attracting foreign direct investment (FDI) due to its stated benefits as a medium for economic development. Africa – and Nigeria specifically – joined the rest of the countries in search of FDI as evidenced by forming of the New Partnership for Africa’s Development (NEPAD), which has the appeal of foreign investment to Africa as a prime factor. Giving Nigeria’s natural resource base and

market size, it will certainly attract more FDI compared to other countries in Africa and in the past decade, Nigeria has been among the top three countries in FDI acquisition (Inekwe, 2013). Financial institutions credit has proven to be more difficult to service than FDI. FDI has a contribution in growing a country's gross capital, improving productivity and market competition, managing human resource and enhancing technology (Esew & Yaroson, 2014). Ayadi (2010) reviews the elements affecting FDI flow into Nigeria both before and after the SAP era. A discovery was made that the macro rules in place before the SAP have been discouraging foreign investors. This policy environment caused the proliferation and boom of parallel markets and sustained capital flight.

Dinda (2016) acknowledged that certain developing countries do not have the necessary resources or domestic capital to fund their operations. The factors that contribute to domestic savings being low include the volatile nature of inflation rates, reduction in per capita income and low exports to GDP ratios. It is asserted that FDI potentially makes a contribution to economic boom not only via imparting foreign capital but with the aid of gaining extra funding via selling linkages. The domestic savings capacity in Nigeria has been positively impacted by the contribution of foreign capital in the economy. Dinda's (2016) representation of the Nigerian investment financing and financial savings in a model examined the influence FDI has on the level of domestic savings and funding. The results verify that financial savings are achieved by using the necessary measures in figuring out an investment boom instead of foreign capital inflows in Nigeria and domestic financial savings are heavily complemented by foreign capital.

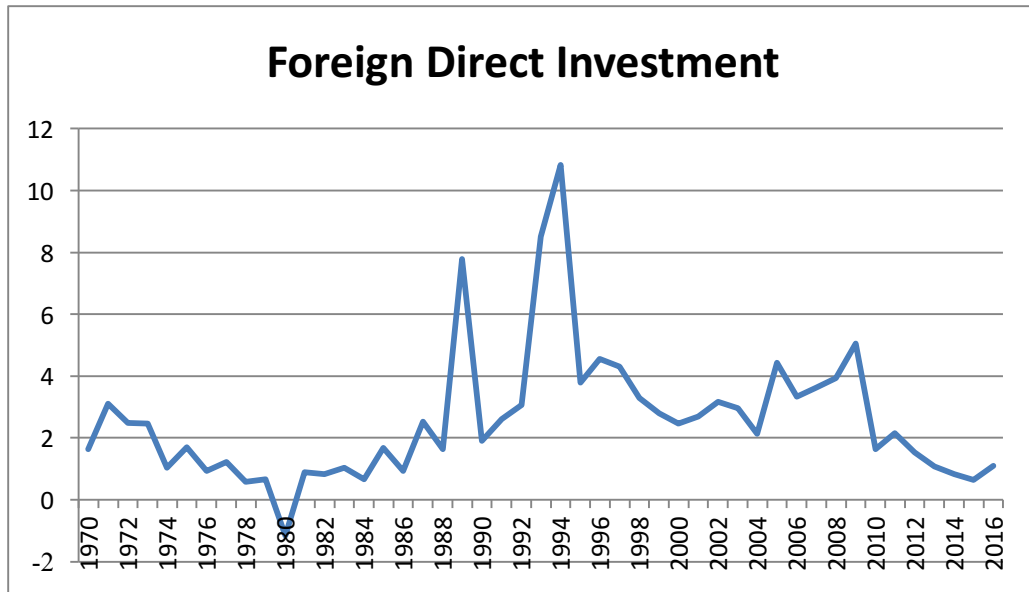


Figure 3: FDI Inflows.  
Source: World Development Indicators.

Figure 3 shows that foreign direct has been a bit volatile but 1994 was the peak of FDI in Nigeria. In 1980, FDI was negative and if figure 2 and 3 are examined together, it can be seen that when exchange rate was most stable is when FDI was at its peak. FDI has been declining as of 2014 and this might be as a result of the recession in Nigeria.

## Chapter 4

### DATA AND METHODOLOGY

#### 4.1 Data Source and Variables

The data for the three variables namely broad money growth, FDI and foreign exchange rate are derived from the World Bank database. The data has further been transformed to logarithm form for compression and better use. The frequency of the variables is annual from 1970 to 2016, which is a period of 46 years. The variables selected are as follows:

- a) Broad Money (Annual %)- this is the total amount of currency in circulation and not in banks. It also includes demand deposits other than that of the government, savings and also foreign currency savings of resident sectors and generally other securities such as certificates of deposits and commercial papers (Katircioglu et al., 2018; Katircioglu, 2017; Sodeyfi, 2016; Sprengle & Miller, 1980).
- b) FDI (FDI net inflows)- this variable represents investments initiated by an investor from a foreign country for which the foreign investor has control over the business as a whole (Yilmaz & Can, 2016; Sanfilippo, 2010).
- c) Official Exchange Rate (LCU per US\$)- this is the exchange rate that is determined by the government or the organization authorized by the government to carry out rate determination. It is also the legally sanctioned exchange rate in the market and it is computed as an annual average based on monthly averages (Taylor, 2004).

## 4.2 Methodology

The main aim for the thesis is to investigate the relationship between exchange rate, FDI and broad money growth and it is portrayed by a model where broad money growth (BM) is a function of exchange rate (XRATE) and also FDI (FDI):

$$BM=f(XRATE, FDI) \quad (1)$$

It basically investigates the long-run and short-run relationship between the variables and also the causal relationship. The Model 1 of the thesis is indicated in logarithm form below:

$$\ln BM_t = \beta_0 + \beta_2 \ln XRATE_t + \beta_3 \ln FDI_t + \varepsilon_t \quad (2)$$

Where broad money growth is represented by its natural logarithmic form as  $\ln BM_t$ ,  $\ln XRATE_t$  represents the natural logarithmic form of exchange rate,  $\ln FDI_t$  represents the natural logarithmic form of FDI and finally  $\varepsilon_t$  refers to the disturbance term.

The first step of an empirical analysis will be to check the data for stationarity as it is of great importance because time series data is highly likely to have unit root.

Firstly, Augmented Dickey-Fuller (ADF), Phillips-Peron (PP) and Kwiatkowski Phillips Schmidt & Shin (KPSS) unit root tests are employed in order to determine the stationarity of the variables. Secondly, the next procedure is the Vector Autoregressive Model (VAR) which will cover the lag length criteria and also determine if there are potential problems such as stability, heteroscedasticity, and autocorrelation. The third procedure is investigating the long run association of the variables with the use of the Johansen Cointegration test.

## 4.3 Unit Root Tests

ADF unit root test is a test in econometrics which determines whether a time series data is stationary or not. The ADF statistic number is always negative and the more negative the number is, the stronger the rejection of the null hypothesis. The null

hypothesis is that the data is nonstationary, that it has unit root while the alternative hypothesis is that the series is stationary/there is no unit root (Sodeyfi & Katircioglu, 2016; Levin & Chu, 2002). The model that is used in the ADF test is shown below where  $\alpha$  represents the constant and  $\beta t$  represents the time trend in the model:

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + u_t \quad (3)$$

The PP test is also a unit root test and it is used for time series analysis. This test builds on the ADF test and both tests basically complement each other. The test has the same null hypothesis as ADF (Maddala & Wu, 1999). Just like ADF, the model used is;

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + u_t \quad (4)$$

KPSS is referred to as a stationary test instead of unit root test and it is used as a confirmatory test. For KPSS, the null hypothesis is there is no unit root/stationary while the alternative hypothesis is there is unit root/nonstationary (Levin & Chu, 2002).

#### **4.4 Vector Autoregressive Model (VAR)**

Vector Autoregressive Models are mainly used to investigate the impacts of policy innovations in an economy (Bernanke, Boivin & Elias, 2005). Zivot and Wang (2006) mentioned that VAR can be essential in forecasting financial or economic phenomenon by analyzing the bearing of time series in econometrics. The VAR model is represented by the following equation:

$$Y_t = c + \Pi_1 Y_{t-1} + \Pi_2 Y_{t-2} + \dots + \Pi_p Y_{t-p} + \varepsilon_t, t = 1, \dots, T \quad (5)$$

#### **4.5 Co-integration Test**

Subsequent to establishing the integration levels of the variables and estimating the VAR model, the co-integration or long-run relationship of the variables should be investigated using the Johansen co-integration test (Gokmenoglu, Apinran &



Taspinar, 2018). The Johansen trace test helps in determining whether there is a co-integrating vector or not and in order to establish that there is co-integration at least one co-integrating vector is needed. Furthermore, it is more reliant to utilize Johansen Trace test instead of maximum eigen value test (Katircioglu et al., 2007). Trace statistic is a determinant of co-integration and can be expressed as follows:

$$\lambda_{\text{trace}} = \sum_{i=r+1}^{n-1} \tau(\lambda_i) \quad (6)$$

and the null hypothesis are

$$H_0: V \leq 0 \quad H_1: V \geq 1$$

$$H_0: V \leq 1 \quad H_1: V \geq 2$$

$$H_0: V \leq 2 \quad H_1: V \geq 3$$

#### 4.6 Vector Error Correction Model (VECM)

The VECM represents the speed of adjustments, long-term coefficients, and short-term coefficients. It is expressed by the following equation:

$$\Delta \ln BM_t = \beta_0 + \sum_{i=0}^n \beta_i \Delta \ln BM_{t-1} + \sum_{i=0}^n \beta_2 \Delta \ln XRATE_{t-1} + \sum_{i=0}^n \beta_3 \Delta \ln FDI_{t-1} + \beta_4 \varepsilon_{t-1} + u_t \quad (7)$$

Where  $\Delta$  in the model shows the change in the BM, XRATE and FDI variables,  $\beta$  represents the speed of adjustment and  $u_t$  represents the error term. The error correction term or speed of adjustment in the direction of equilibrium is meant to be negative and also statistically significant, and only then, it proves a long-run association between the variables.

$$\Delta y_t = \beta_1 \Delta x_t + \beta_2 (y_{t-1} - y_{x_{t-1}}) + u_t \quad (8)$$

Equation 8 portrays  $\beta_1$  as the representation of the short run relationship,  $\beta_2$  as the representation of the speed of adjustment and finally  $(y_{t-1} - y_{x_{t-1}})$  is the error correction term.

## 4.7 Granger Causality Test

Granger causality is basically a statistical test used in determining if a variable is useful in forecasting another variable in a time series (Granger, 1980). Causality is simply a process of pairing variables as it portrays the unidirectional and bi-directional relationship between variables. The null hypothesis for this test is that there is no Granger causality while the alternative hypothesis is there is Granger causality. The econometric formulas for the Granger causality with regards to the VECM are as follows:

$$\Delta \ln Y_t = \alpha_0 + \sum_{i=0}^n \beta_i \Delta \ln Y_{t-1} + \sum_{i=0}^n \beta_2 \Delta \ln X_{t-1} + \theta_i \text{ECT}_{t-1} + \varepsilon_t \quad (9)$$

$$\Delta \ln X_t = \alpha_0 + \sum_{i=0}^n \beta_3 \Delta \ln X_{t-1} + \sum_{i=0}^n \beta_4 \Delta \ln Y_{t-1} + \theta_i \text{ECT}_{t-1} + \varepsilon_t \quad (10)$$

As seen in both equation 9 and 10, Y and X represent the series, the coefficients of  $\text{ECT}_{t-1}$  are represented by  $\theta_i$  which portrays the error term in both models and the first difference form of the variables is  $\Delta$ . Equation 9 suggests variable X Granger causes Y considering the coefficient of error correction term is significant. Consequently, equation 10 suggests that variable Y Granger causes X as portrayed by the significance of the coefficient of the vector error term. The significance of the error correction coefficient is tested by the t-test and the null hypothesis of  $\beta_2$  and  $\beta_4$  is tested by the F-test.

## 4.8 Impulse Response Function

Impulse-response refers to the reaction of a variable in response to an external change or an external shock (Farina, 2000). The impulse functions are utilized on reporting the reaction of an economy to exogenous impulses popularly referred to as shocks and they are modeled in terms of vector autoregression (Lütkepohl, 2018). Furthermore, Lütkepohl (2018) stated that even though the impulse response might

not be clear, they are of great importance in studying certain economic complications.

#### **4.9 Variance Decomposition**

Variance decomposition has the function of determining how much of the forecast errors variance of variables can be portrayed by exogenous shocks with regards to the other variables and it also refers to the number of information the variables put together in the autoregression (Domingos, 2000).

## Chapter 5

### EMPIRICAL RESULTS

#### 5.1 Unit root test

All the variables were tested at their level forms and also at their first difference form. The stationary position is presented in Table 1.

Table 1: ADF, PP and KPSS Tests for Unit Root

Statistics (Level)	LNBM	lag	LNXRATE	lag	LNFDI	lag
$\tau_T$ (ADF)	-3.351	(0)	-1.700	(0)	-2.696	(0)
$\tau_u$ (ADF)	-3.551	(1)	-0.138	(0)	-2.728	(0)
$\tau$ (ADF)	-1.154	(0)	2.037	(0)	-1.927	(0)
$\tau_T$ (PP)	-2.199	(2)	-1.949	(3)	-2.586	(2)
$\tau_u$ (PP)	-2.525	(2)	-0.252	(3)	-2.612	(2)
$\tau$ (PP)	-1.004	(27)	1.455	(3)	-1.823	(7)
$\tau_T$ (KPSS)	0.123*	(3)	0.113	(5)	0.141***	(5)
$\tau_u$ (KPSS)	0.182*	(3)	0.839*	(5)	0.210	(5)

Statistics (First Difference)	LNBM	lag	LNXRATE	lag	LNFDI	lag
$\tau_T$ (ADF)	-6.175*	(1)	-5.361*	(0)	-11.27*	(0)
$\tau_u$ (ADF)	-6.082*	(1)	-5.418*	(0)	-11.41*	(0)
$\tau$ (ADF)	-6.184*	(1)	-4.635*	(0)	-11.49*	(0)
$\tau_T$ (PP)	-17.63*	(27)	-5.364*	(2)	-11.15*	(2)
$\tau_u$ (PP)	-12.48*	(17)	-5.420*	(2)	-11.28*	(2)
$\tau$ (PP)	-12.70*	(17)	-4.713*	(3)	-11.31*	(2)
$\tau_T$ (KPSS)	0.432	(39)	0.1463**	(3)	0.225*	(27)
$\tau_u$ (KPSS)	0.399	(36)	0.148	(3)	0.305	(29)

Note: LNBM is the logarithmic representation of broad money growth; LNXRATE is the logarithmic representation of exchange rate; LNFDI is the logarithmic representation of FDI.  $\tau_T$  constitutes the most general model with a trend and intercept;  $\tau_u$  constitutes the model without a trend and with an intercept;  $\tau$  is the one with neither trend nor intercept. The figures in parentheses are the lag lengths in ADF test and also the Newey-West Bandwith (Bartlett-Kernel) in PP test. The unit root tests and stationarity test were carried out from the most general to the most restricted model. \*, \*\* and \*\*\* represent a rejection of the null hypothesis at 1 percent, 5 percent and 10 percent levels respectively. E-VIEWS 9.0 was used to perform the tests.

Table 1 indicates the result of the unit root tests. According to the ADF and PP results, at level form, all the variables are nonstationary whether intercept, trend, and intercept or none. But after taking the first difference, the data becomes stationary considering intercept, trend and intercept and none. Lastly, with regards to KPSS, the stationarity of the variables at the level and first difference form confirms the other two tests.

## **5.2 Vector Autoregressive Model (VAR)**

In situations where a study aims at examining the long-run association between variables, there is no need to interpret the VAR coefficients as they only give the short-run relationship between the variables (Lima, 2005). Assuming that there is no single co-integrating vector, Table 2 shows that the short run relationship will be interpreted in such a way that a 1 percent increase in DLNBM will result in 0.85 percent increase in DLNXRATE. Also a 1 percent increase DLNXRATE will decrease DLNFDI by 0.05 percent.

Table 2: Vector Autoregressive Model

	<i>DLNBM</i>	<i>DLNXRATE</i>	<i>DLNFDI</i>
<b>DLNBM(-1)</b>	-0.226972 (0.15080) [-1.50516]	-0.023681 (0.05968) [-0.39680]	0.074434 (0.10358) [ 0.71859]
<b>DLNXRATE(-1)</b>	0.854556* (0.43267) [ 1.97506]	0.197411 (0.17123) [ 1.15288]	0.275353 (0.29721) [ 0.92646]
<b>DLNFDI(-1)</b>	-0.190582 (0.21047) [-0.90550]	-0.054266* (0.08330) [-0.65148]	-0.554052 (0.14458) [-3.83225]
<b>C</b>	0.200470 (0.27877) [ 0.71912]	0.140735 (0.11033) [ 1.27562]	0.022905 (0.19149) [ 0.11961]
<b>@TREND</b>	-0.010960 (0.00952) [-1.15081]	-0.000945 (0.00377) [-0.25074]	-0.003446 (0.00654) [-0.52678]
<b>R-squared</b>	0.156405	0.042688	0.316795
<b>Adj. R-squared</b>	0.059995	-0.066719	0.238715
<b>Sum sq. resids</b>	20.02871	3.136962	9.450592
<b>S.E. equation</b>	0.756471	0.299378	0.519632
<b>F-statistic</b>	1.622280	0.390173	4.057285
<b>Log likelihood</b>	-42.92329	-5.845047	-27.90150
<b>Akaike AIC</b>	2.396164	0.542252	1.645075
<b>Schwarz SC</b>	2.607274	0.753362	1.856185
<b>Mean dependent</b>	0.046898	0.145754	-0.016669
<b>S.D. dependent</b>	0.780238	0.289865	0.595555
<b>Determinant resid covariance (dof adj.)</b>	0.013094		
<b>Determinant resid covariance</b>	0.008772		
<b>Log-likelihood</b>	-75.54819		
<b>Akaike information criterion</b>	4.527409		

Note: \* and \*\* indicates rejection of the null hypothesis at 1% and 5% respectively

With regards to table 3, The Schwarz information criterion can be considered more preferable as it tends to give better results and it is more restrictive. In this case, Schwarz and Hannan-Quinn suggest 0 lags. Furthermore, three of the criteria suggest 1 lag and it is evident that the minimum amount of lag is preferred as lags consume the degree of freedom. The number of lag chosen is 1 lag because three out of five criteria suggest 1 lag and they are LR, FPE, and AIC.

Table 3: Lags Length Selection

<b>Lag</b>	<b>LogL</b>	<b>LA</b>	<b>FPE</b>	<b>AIC</b>	<b>SC</b>	<b>HQ</b>
<b>0</b>	-81.941	NA	0.0265	4.8856	5.1495*	4.9777*
<b>1</b>	-71.892	17.306*	0.0252*	4.8273*	5.4871	5.0576
<b>2</b>	-67.454	6.9028	0.0330	5.0808	6.1364	5.4492
<b>3</b>	-60.616	9.4977	0.0386	5.2008	6.6524	5.7075

*Note: \*indicates the chosen lag by the criterion.*

The stability of the VAR is checked through the AR Roots Graph. In the Inverse Roots of AR Characteristics Polynomial diagram in figure 4, all the roots are within the circle, and this signifies that the VAR is stable.

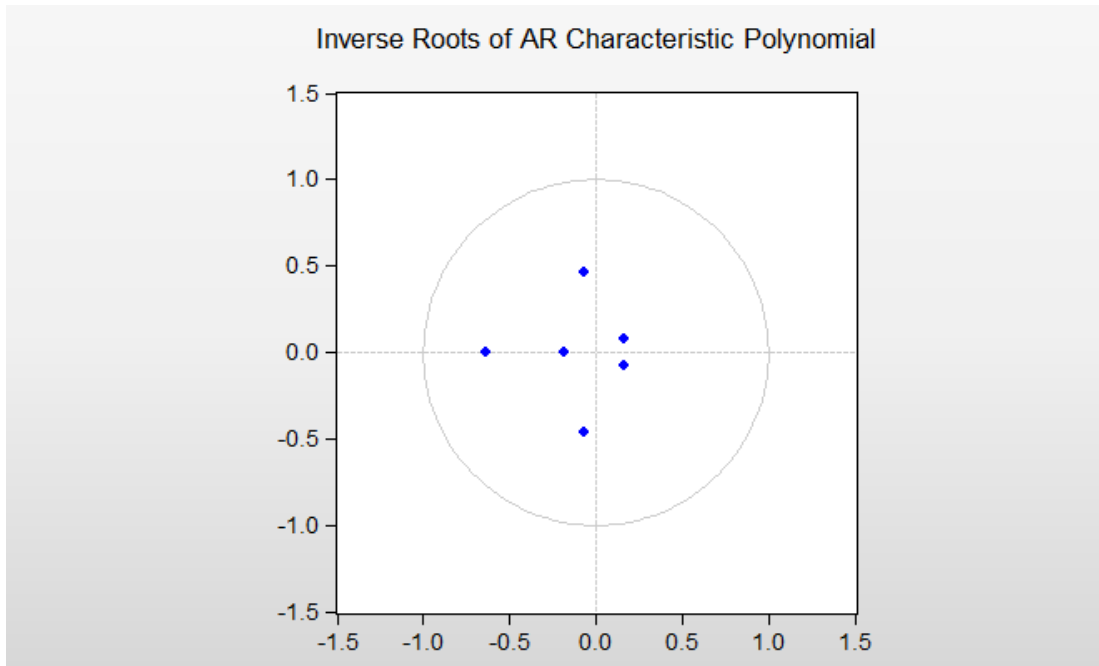


Figure 4: Stability of VAR  
Source: Eviews 9

The first diagnostic test is the autocorrelation LM test and the null hypothesis for this test is that there is no serial correlation while the alternative hypothesis is there is a serial correlation. When table 4 is examined, it can be seen that the Prob values are insignificant and this means that the null hypothesis is failed to be rejected, therefore there is no serial correlation.

Table 4: Autocorrelation LM Test

<i>Lags</i>	<i>LM-Stat</i>	<i>Prob</i>
<b>1</b>	4.969191	0.8370
<b>2</b>	10.00226	0.3503
<b>3</b>	3.679178	0.9312

*Note: \* and \*\* indicates rejection of the null hypothesis at 1% and 5% respectively*



Secondly, the White test was used to test for heteroscedasticity where the null hypothesis is no heteroscedasticity and the alternative hypothesis is there is heteroscedasticity. Based on table 5, we fail to reject the null hypothesis which means there is no heteroscedasticity.

Table 5: White Tests for Heteroscedasticity

<i>Chi-sq</i>	<i>df</i>	<i>Prob</i>			
91.49151	84	0.2700			
<b>Individual components:</b>					
<b>Dependent</b>	<b>R-squared</b>	<b>F(14,23)</b>	<b>Prob.</b>	<b>Chi-sq(14)</b>	<b>Prob.</b>
res1*res1	0.418965	1.184609	0.3483	15.92067	0.3182
res2*res2	0.123004	0.230420	0.9967	4.674136	0.9899
res3*res3	0.570739	2.184319	0.0467	21.68808	0.0853
res2*res1	0.371060	0.969250	0.5100	14.10030	0.4423
res3*res1	0.478613	1.508077	0.1852	18.18728	0.1984
res3*res2	0.647162	3.013268	0.0093	24.59216	0.0388

Note: \* and \*\* indicates rejection of the null hypothesis at 1% and 5% respectively

### 5.3 Co-integration Analysis

The Johansen Co-integration Test was carried out after discovering all the variables are I(1) and the dependent variable in the model is BM while the independent variables are FDI and XRATE. The Johansen co-integration in table 6 comprises trace statistic figures and it is evident that one co-integrating vector exists. There is a co-integrating relationship between the variables and this shows that in the long-run, these variables will converge. Furthermore, based on the Pantula principle, MODEL 3 was selected and also the principle is adopted in the determination of the appropriate lag length.

Table 6: Johansen Co-integration Table

	<i>MODEL 2</i>	<i>MODEL 3</i>	<i>MODEL 4</i>
<i>None</i>	40.797*	30.752*	40.844*
<i>At most 1</i>	17.063*	7.8458	17.498
<i>At most 2</i>	6.6862	0.1050	3.7164

Note: \* indicates rejection of the null hypothesis

#### 5.4 Vector Error Correction Model (VECM)

Subsequent to determining the long-run virtues of the coefficients, the next procedure is the vector error correction and through this, the speed of adjustment is determined, and long-run as well as short run coefficients are estimated.

##### a) Speed of Adjustments

The speed of adjustment is referred to as the mean of the length of periods that are needed for transmission with regards to the effectiveness of an exogenous shock from the independent variable to the dependent variable of a model (Lanza, 1991). The speed of adjustment is signified by the variable that has a significant coefficient and the coefficient must be between 0 and -1. With reference to table 7, the variables of the model are converging at 0.58, therefore with the help of FDI and XRATE, variables are converging by the speed of adjustment of 0.58%.

Table 7: Speed of Adjustment

<i>Error Correction:</i>	<i>D(LNBM)</i>	<i>D(LNFDI)</i>	<i>D(LNXRATE)</i>
<i>CointEq1</i>	-0.581097*	0.174358	-0.098313
	(0.16917)	(0.12901)	(0.07870)
	[-3.43498]	[ 1.35151]	[-1.24921]

Note: \* indicates rejection of the null hypothesis

b) Long-run Coefficients

Based on table 8, it can be said that a 1 percent increase in LNFDI will result in a 0.77 percent increase in LNBM in the long-run. Furthermore, a 1 percent increase in LNXRATE causes a 0.12 percent decrease in LNBM. This proves that there is a long-run association between XRATE, FDI, and BM. As FDI inflow increases in the Nigerian economy, broad money will be positively impacted and also if the exchange rate depreciates, broad money growth will be impacted negatively.

Table 8: VECM Long Term Coefficients

<i>Cointegrating Eq:</i>	<i>CointEq1</i>
<b>LNBM(-1)</b>	1.000000
<b>LNFDI(-1)</b>	0.778314* (0.25626) [-3.03720]
<b>LNXRATE(-1)</b>	-0.121594* (0.07092) [ 1.71464]
<b>C</b>	-2.822547 (0.28202) [-10.0082]

*Note: \* indicates rejection of the null hypothesis*

c) Short-Term Coefficients

In table 9, it can be seen that all the variables are not statistically significant, therefore it is evident that there is no short-run association between the variables.

Table 9: VECM Short Term Coefficients

<i>Error Correction:</i>	<i>D(LNBM)</i>	<i>D(LNFDI)</i>	<i>D(LNXRATE)</i>
<b>CointEq1</b>	-0.581097 (0.16917) [-3.43498]	0.174358 (0.12901) [ 1.35151]	-0.098313 (0.07870) [-1.24921]
<b>D(LNBM(-1))</b>	0.129096 (0.16154) [ 0.79916]	-0.010397 (0.12319) [-0.08440]	0.021880 (0.07515) [ 0.29116]
<b>D(LNFDI(-1))</b>	-0.300227 (0.18689) [-1.60643]	-0.485016 (0.14252) [-3.40306]	-0.103098 (0.08694) [-1.18580]
<b>D(LNXRATE(-1))</b>	0.461404 (0.34554) [ 1.33532]	0.259195 (0.26351) [ 0.98362]	0.323397 (0.16075) [ 2.01181]
<b>R-squared</b>	0.334177	0.335386	-0.044060
<b>Adj. R-squared</b>	0.278691	0.280002	-0.131065
<b>Sum sq. resids</b>	15.80804	9.193423	3.421221
<b>S.E. equation</b>	0.662656	0.505344	0.308276
<b>F-statistic</b>	6.022801	6.055602	-0.506411
<b>Log likelihood</b>	-38.19033	-27.34972	-7.579903
<b>Akaike AIC</b>	2.109516	1.567486	0.578995
<b>Schwarz SC</b>	2.278404	1.736374	0.747883
<b>Mean dependent</b>	0.046898	-0.016669	0.145754
<b>S.D. dependent</b>	0.780238	0.595555	0.289865

Note: \* indicates rejection of the null hypothesis

## 5.5 Granger Causality Test

Firstly, table 10 shows that there is a Granger causality from XRATE to BM. This means that there is a unidirectional causality running from XRATE to BM and this indicates that a change in XRATE leads to a change in BM. Secondly, table 10 also shows that there is a Granger causality from BM to FDI which means there is a unidirectional causality running from BM to FDI and a change in BM will lead to a

change on FDI. Also, there is a unidirectional causality from XRATE to FDI which indicates that a change in XRATE leads to a change in FDI.

Table 10: Granger Causality Test

***Dependent variable: LNBM***

<b>Excluded</b>	Chi-sq	Prob.
<b>LNFDI</b>	1.753330	0.1855
<b>LNXRATE</b>	2.836795	0.0921*
<b>All</b>	3.160948	0.2059

***Dependent variable: LNFDI***

<b>Excluded</b>	Chi-sq	Prob.
<b>LNBM</b>	10.47282	0.0012*
<b>LNXRATE</b>	3.543468	0.0598*
<b>All</b>	10.48245	0.0053

*Note: \* indicates rejection of the null hypothesis*

## 5.6 Impulse Response Function

As seen in figure 5, the own shock of DLNBM is quite interesting as the variable sharply goes down and does not move back to its original position. The Impulse Response Function analysis of DLNFDI to DLNBM shows that the standard deviation shock of DLNFDI to DLNBM is positive between the period 1 and 2 and instantly became negative from period 3 to period 4. The shock remained positive and was basically close to zero from period 4 to 10. Also, the analysis of DLNXRATE to DLNBM shows that the standard deviation shock of DLNFDI to DLNBM is positive at period 1 and negative at period 2. From period 4 it remains

zero up to period 10. Another interesting figure is the own shock of DLNFDI and DLNXRATE which shows the same scenario as DLNBM. The other graphs show a brief response to the shocks but they eventually go back to their original positions.

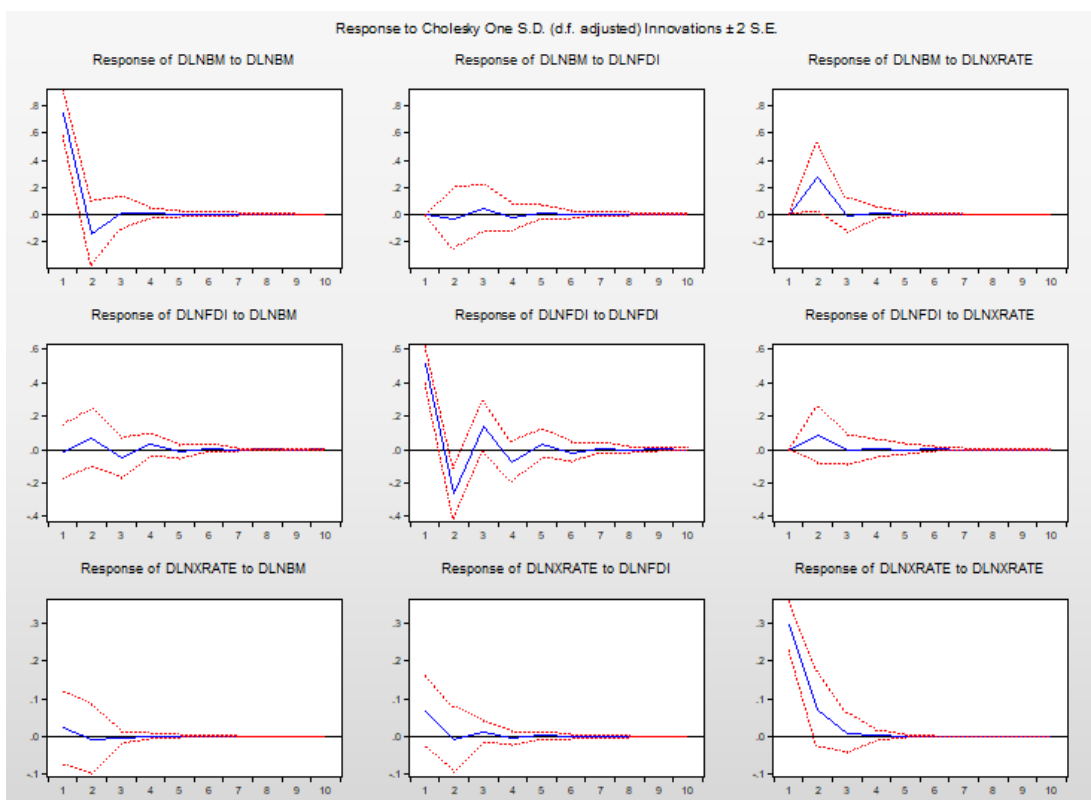


Figure 5: Impulse Response Function  
Source: Eviews 9

## 5.7 Variance Decomposition

Based on table 11, if there is an exogenous shock on DLNBM, there will be a 100 percent variation in DNLNBM and 0 variation in DLNFDI, and also a 0 variation in DLNXRATE in the first period. At period 10, if there is an exogenous shock on DLNBM, there will be 0.63 percent variation on DLNFDI and 11 percent variation on DLNXRATE. These variations are consistent with the previous periods.

Furthermore, if there is an exogenous shock on DLNFDI, in the first period there will be 0.099 percent variation on DLNBM, 99 percent on DLNFDI and 0 variations on DLNXRATE. In the tenth period, there will be 2.4 percent variation on DLNBM, 95 percent on DLNFDI and 1.85 percent on DLNXRATE.

Lastly, if an exogenous shock is given to DLNXRATE, there will be a 0.51 percent variation in DLNBM, 5.1 percent in DLNFDI and 94.3 percent in DLNXRATE in the first period. In the period 10, there will be a 0.56 percent variation in DLNBM, 5.08 percent in DLNFDI and still 94.3 percent in DLNXRATE.

Table 11: Variance Decomposition Table

<b>Variance Decomposition of DLNBM:</b>				
<b>Period</b>	S.E.	DLNBM	DLNFDI	DLNXRATE
<b>1</b>	0.751381	100.0000	0.000000	0.000000
<b>2</b>	0.811819	88.73717	0.157060	11.10577
<b>3</b>	0.813325	88.42591	0.498059	11.07603
<b>4</b>	0.813817	88.32237	0.598217	11.07942
<b>5</b>	0.813955	88.29608	0.628121	11.07580
<b>6</b>	0.813992	88.28931	0.635845	11.07485
<b>7</b>	0.814001	88.28758	0.637832	11.07459
<b>8</b>	0.814004	88.28714	0.638333	11.07452
<b>9</b>	0.814004	88.28703	0.638460	11.07451
<b>10</b>	0.814004	88.28701	0.638491	11.07450

Table 11: Variance Decomposition Table (Continued)

<b>Variance Decomposition of DLNFDI:</b>				
<b>Period</b>	<b>S.E.</b>	<b>DLNBM</b>	<b>DLNFDI</b>	<b>DLNXRATE</b>
<b>1</b>	0.512468	0.099703	99.90030	0.000000
<b>2</b>	0.586894	1.564997	96.43272	2.002286
<b>3</b>	0.605943	2.221648	95.89241	1.885944
<b>4</b>	0.610827	2.413036	95.72534	1.861624
<b>5</b>	0.612078	2.465226	95.68045	1.854320
<b>6</b>	0.612394	2.478716	95.66879	1.852494
<b>7</b>	0.612474	2.482152	95.66582	1.852028
<b>8</b>	0.612494	2.483018	95.66507	1.851911
<b>9</b>	0.612499	2.483236	95.66488	1.851881
<b>10</b>	0.612500	2.483291	95.66483	1.851874

<b>Variance Decomposition of DLNXRATE:</b>				
<b>Period</b>	<b>S.E.</b>	<b>DLNBM</b>	<b>DLNFDI</b>	<b>DLNXRATE</b>
<b>1</b>	0.301975	0.513663	5.105894	94.38044
<b>2</b>	0.310646	0.551105	4.914792	94.53410
<b>3</b>	0.310992	0.558703	5.046489	94.39481
<b>4</b>	0.311050	0.561687	5.072423	94.36589
<b>5</b>	0.311065	0.562967	5.080230	94.35680
<b>6</b>	0.311069	0.563309	5.082136	94.35455
<b>7</b>	0.311070	0.563401	5.082625	94.35397
<b>8</b>	0.311070	0.563424	5.082748	94.35383
<b>9</b>	0.311070	0.563430	5.082778	94.35379
<b>10</b>	0.311070	0.563432	5.082786	94.35378

Figure 6 of the variance decomposition are simply visual representations of the figures given as output in the variance decomposition table.



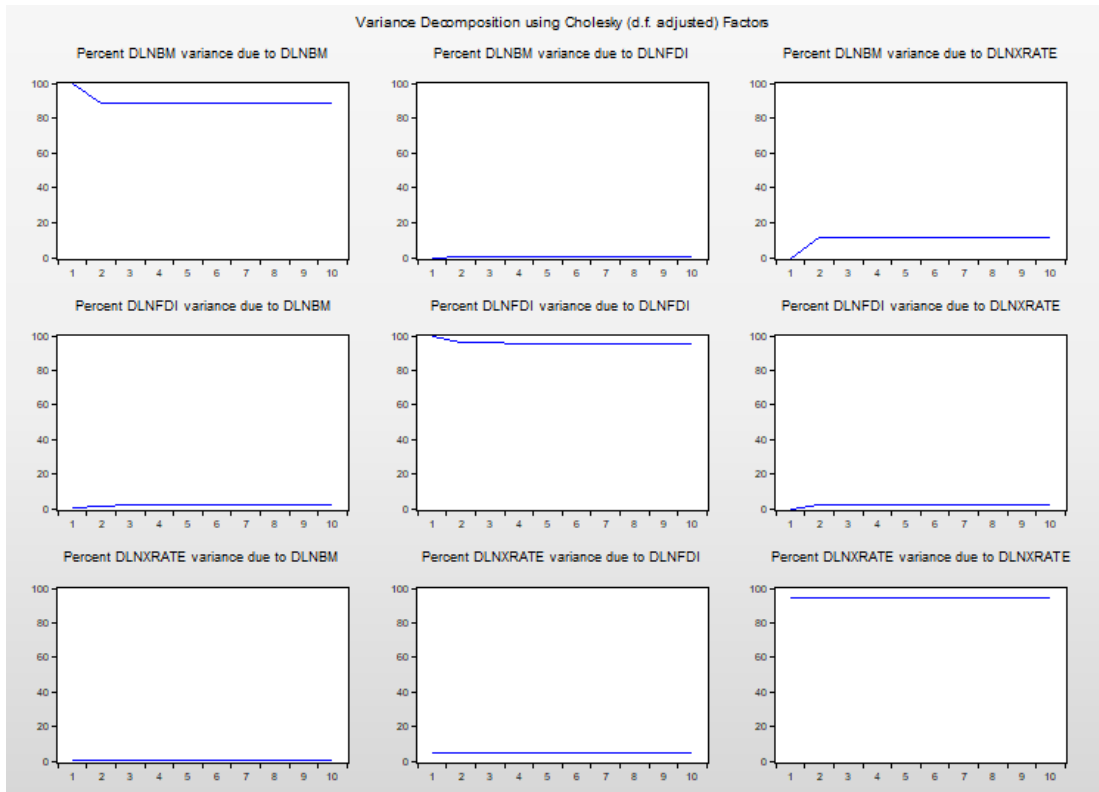


Figure 6: Variance Decomposition Graph  
Source: Eviews 9

## Chapter 6

### CONCLUSION AND RECOMMENDATIONS

This thesis aims at examining the relationship between broad money, exchange rate, and FDI in Nigeria with the use of time series data from 1970 to 2016. As a first thing, the stationarity of the variables was checked and the variables became stationary after taking the first difference. Secondly, the VAR model was estimated and the appropriate lag length is 1. It is evident that there are no diagnostic problems and also the VAR model is stable as all the roots are within the circle. Thirdly, the Johansen Cointegration test proved that there is one co-integrating vector which means there is a long-run relationship between broad money, exchange rate, and FDI. The results have shown that FDI and exchange rate are determinants of broad money growth in the Nigerian economy.

Furthermore, the model shows that both FDI and exchange rate have a statistically significant and direct impact on broad money growth. The results from the thesis suggest that in the long-run, a 1 percent increase in FDI will bring about a 0.77 percent increase in broad money. Also, a 1 percent increase in the exchange rate will result in a 0.12 percent decrease in broad money. The reason behind this negative relationship can be due to the fact that Nigeria is an exporting country and interest rate is high, therefore the money supply will be low. In the short run, all the variables are not statistically significant therefore no economic interpretation can be made with regards to short-term association.

The results are basically logical and it can be seen that there is a causal relationship from exchange rate to broad money, broad money to FDI, and finally exchange rate to FDI. A change in exchange rate leads to a change in FDI inflow and broad money growth in Nigeria. If exchange rate increases, it impacts broad money growth negatively and this is not in favor of the Nigerian economy. The reason behind this negative relationship is as a result of the drastic depletion in the foreign reserves of Nigeria due to the fall in oil prices in the past three years. Consequently, banks and governmental bodies were responsible for hoarding foreign exchange with the intention of stabilizing the exchange rate. Between 2015 and 2016, the exchange rate increased by over 100 percent to a dollar and this explains why broad money growth and money supply in Nigeria decreased drastically. Moreover, the more FDI inflows Nigeria gets, the more money will circulate within the economy. If there is an increase in FDI, it means that there will be growth in broad money and there will be more money in circulation in Nigerian households.

The error correction term is statistically significant and negative as expected and it suggests that the growth in broad money in Nigeria converges with its long-run equilibrium level at 58% speed of adjustment with the help of FDI and XRATE. In economics, this speed of adjustment cannot be regarded as a low convergence and moreover, it is significant and negative. Also as mentioned earlier on, the Impulse Response Function analysis of a shock from DLNFDI to DLNBM is portraying a positive flow between the period 1 to 2, and negative flow from period 3 to period 4. On the other hand analysis of DLNXRATE to DLNBM shows that the shock of DLNFDI to DLNBM was positive at the period 1 and went negative at period 2 and from period 4 it remains zero up to period 10.

A recommendation for policymakers based on the findings of this thesis is for the Nigerian government to adopt a new exchange rate regime. Nigeria is currently operating a floating exchange rate regime. The most suitable currency regime for Nigeria is exchange rates within crawling bands. In this currency regime, the domestic currency is retained within specific fluctuation margin that is centered around a central rate. This central rate is adjusted on a timely basis at a preannounced fixed rate and it is also adjusted based on changes from selected quantitative indicators. The huge gap that exists between the parallel market and inter-bank foreign exchange rate must be narrowed down in order to ensure that the foreign currency trading environment is improved.

Nigeria has a record of poor monetary policy implementation even though it is the most suitable policy if it will be used to increase broad money and also target inflation. Targeting inflation with monetary policy will lead to the appreciation of the Naira, and if it appreciates, broad money in Nigeria will increase, thereby increasing the purchasing power of the citizens. Also, in order to secure the appreciation of the exchange rate, the Nigerian government needs to decrease imports and increase exports. The trade balance of Nigeria needs to be positive and in order to do so, taxes should be increased on imports and more specifically, there should be a tremendous increase of tax on luxury imports.

The Nigerian government needs to attract more foreign investors by ensuring the Securities and Exchange Commission of Nigeria carries out its objective of protecting investors and also the government should provide the necessary infrastructure that will attract more FDI inflows. To attract FDI, derivatives such as

foreign exchange futures should be made available for investors. Investors especially those that are risk averse will be given an opportunity to hedge risk.

In order to better the Nigerian economy and promote economic growth, this thesis recommends that the CBN and also commercial banks lean towards ensuring stability in foreign exchange rates by increasing liquidity in the Nigerian economy due to their money creation capacity. Also, CBN has to ensure the process of financial integration is smooth by coordinating competent monetary policies and ensuring that banks are actively involved in implementing these policies.

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