EXCHANGE RATE VOLATILITY, EXTERNAL SHOCK, AND CAPITAL INFLOWS IN NIGERIA

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ABSTRACT

This research focuses on exchange rate volatility, external shock, and capital inflows. The study uses secondary data for the period of 1986 to 2014 for its analysis. The three specific objectives of the study are to investigate whether current exchange rate volatility has any relationship with its conditional volatility in periods ahead using Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) technique; to examine the impact of external shocks on exchange rate volatility; and to evaluate the relationship between capital inflows and exchange rate volatility using Autoregressive Distributed Lags (ARDL) and Johansen co-integration methods, respectively. The results show that current exchange rate volatility is related to its conditional volatility in periods ahead, external shock significantly impacted on exchange rate volatility and that exchange rate volatility significantly explains capital inflows. Based on these findings, the research recommends that minimizing effects of exchange rate volatility on its conditional volatility in periods ahead. So, the government needs proactive monetary and fiscal policies like prudent allocation of foreign currencies through Central Bank of Nigeria, direct swap of Naira to other currency aside United States Dollar (USD), and diversifying the economy to increase non-oil exports. The study suggested that political instability can be addressed through jobs creation for the youth like investment in small and medium enterprises, provision of affordable basic necessities of life, proper remuneration and equipping the security agencies. On oil price, the government should diversify the economy for the solid minerals and agricultural sectors to lead as Nigeria exports. The recommendations on financial crisis are that government should have a database for prompt response and forecasting. Financial leakage should address and reckless corrupt practices should legally deal with. This study equally recommends conducive legal, stable infrastructure, and reliable security framework for achieving sustainable capital inflows.

Keywords: exchange rate volatility, external shock, capital inflows, Nigeria.

ABSTRAK

Kajian ini memberi tumpuan kepada ketidaktentuan kadar pertukaran, kejutan luaran, dan aliran masuk modal. Analisis kajian menggunakan data sekunder bagi tempoh 1986-2014. Tiga objektif khusus kajian adalah untuk mengenal pasti sama ada ketidaktentuan kadar pertukaran semasa mempunyai hubung kait dengan keadaan turun naik pada masa akan datang dengan menggunakan teknik Heteroskedastisiti Eksponen Umum Autoregresif Bersyarat (EGARCH); menyelidik kesan kejutan luaran terhadap ketidaktentuan kadar pertukaran; dan menilai hubungan antara aliran masuk modal dan kadar pertukaran menggunakan Lat Teragih Autoregresif (ARDL) dan kaedah integrasi Johansen. Dapatan kajian menunjukkan bahawa ketidaktentuan kadar pertukaran semasa berkait dengan keadaan turun naik pada masa akan datang, kejutan luaran memberi kesan yang ketara kepada keadaan turun naik kadar pertukaran, dan keadaan turun naik kadar pertukaran secara signifikan menjelaskan aliran masuk modal. Berdasarkan penemuan ini, kajian mencadangkan agar kesan ke atas keadaan turun naik kadar pertukaran pada masa hadapan diminimumkan. Dengan itu, kerajaan memerlukan dasar kewangan yang proaktif dan dasar fiskal seperti peruntukan berhemat mata wang asing melalui Bank Pusat Nigeria, *swap* langsung Naira kepada mata wang lain selain Dolar Amerika (USD), dan mempelbagaikan ekonomi untuk meningkatkan eksport bukan minyak. Kajian ini mencadangkan bahawa ketidakstabilan politik boleh diatasi melalui penyediaan peluang pekerjaan kepada belia seperti pelaburan dalam perusahaan kecil dan sederhana, penyediaan kemudahan asas kehidupan yang berpatutan, saraan dan melengkapkan agensi-agensi keselamatan. Berkaitan dengan harga minyak pula, kerajaan perlu mempelbagaikan ekonomi bagi mineral pepejal dan sektor pertanian untuk menjadikannya sebagai eksport utama Nigeria. Bagi menangani krisis kewangan, kerajaan dicadangkan supaya mempunyai pangkalan data untuk peramalan dan tindak balas yang cepat. Masalah kebocoran kewangan perlu ditangani dan amalan rasuah haruslah dibanteras. Di samping itu, undang-undang yang kondusif, infrastruktur yang stabil, dan rangka kerja keselamatan yang kukuh pula dicadangkan bagi mencapai aliran masuk modal yang mampan.

Kata kunci: ketidaktentuan kadar pertukaran, kejutan luar, aliran masuk modal, Nigeria.

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ERV	Exchange Rate Volatility.
ER	Exchange Rate
OP	Oil Price
PI	Political Instability
GDP	Gross Domestic Product
TOP	Trade Openness
GE	Government Expenditure
CI	Capital Inflows
FR	Foreign Reserve
ARCH	Autoregressive Conditional Heteroskedasticity
EGARCH	Exponential Generalized Autoregressive Conditional Heteroskedasticity
CBN	Central Bank of Nigeria
BOS	Bureau of Statistics
SAP	Structural Adjustment Programme
SSA	Sub-Sahara Africa
M & A	Merger and Acquisition
SFEM	Second-Tier Foreign Exchange Market

CHAPTER ONE
INTRODUCTION

1.1 Introduction

This chapter introduces the thesis. Whereas Section 1.1 provides the background to this study and Section 1.2 presents the problems addressed in this study. Section 1.3 and Section 1.4 present the research questions and objectives of this study, respectively. While Section 1.5 discusses the significance of this study, Section 1.6 explains the scope of this study and Section 1.7 discusses the organization of this thesis. Finally, Section 1.8 concludes this chapter.

1.2 Background of the Study

Nigeria, like many underdeveloped economies of the world, has experienced external shock emanating from worsening terms of trade obviously on account of fluctuations in the international commodity price (agricultural product, oil and gas prices), financial market crisis, property price, war and terrorism, natural disaster, political instability and economic policy shock (Abdur, 2015; Almukhtar, 2013; Chad & Meredith, 2014; Jiménez-Rodríguez, 2008). Among researchers, there has not be been a conventional or a generally accepted definition of what is external shock. Some scholars like Ahmed and Alih (1999), Ahmet, Sensoy and Sobaci (2014), Alley, Asekomeh, Mobolaji, and Adeniran (2014), Almukhtar (2013), Ibrahim (2013), Obaseke (2001), Reys (2006) and Thorsten (2015) are of the opinion that external shocks in Nigeria and other economic community of west African states (ECOWAS) basically are distortions that are not

projected or planned for in a country's development plan or the annual budget and they negatively affect the fluidity in its implementation. These scholars posited that external shocks occur if the macroeconomic parameter disorders give rise to an imbalance in the level of demand and supply of what the economy imports and exports, respectively.

Similarly, other scholars like Aizenman, Edward, and Riera-crichton (2012), Cashin, Mohaddes, Raissi, and Raissi (2014), Khan (1974), Kroner and Lanstrapes (2002), Pickard (2003), Sapiro, Sekkat, and Weber (1994) and Zhao, Zhang, Wang, and Xu (2014) believed that external shock is any unplanned distortion that impaired the actualization of a desired target by a country at a particular point in time. To them, external shocks can be positive or negative; since the developmental plan or the annual state budgets do not cover them, thus, it becomes a problem (be it a boom or a glut).

In their own contribution, Bundesbank (2010), Collier and Goderis (2009), Obadan (2010) and Tiago and João (2013) opined that external shock is any condition that compromises the achievement of a laid down developmental plan of a country, either for a year or a specified period of time. These scholars maintained that whether the determinants of this situation is externally or internally to an economy, it should be regarded as an external shock, since it leads to the non-actualization of the projected developmental plan or annual state budget targets. These scholars also, emphasised that both internal and external shocks are externalities and moved toward the un-actualization of a nation's developmental plan and annual budget targets and should thus be considered as an external shock. The above positions make it lighter for external shock to be referred

to as any shock that can distort the projected target of a national developmental plan or the budget for the fiscal economic year. Thus, it can either be motivated from external or internal source or by boom or burst.

The existence of these distortions that led to the un-implementation of countries developmental plan has sprung up monumental challenge to policymakers and researchers alike. There has been a controversy among researchers and policymakers on what policy response that will address fluctuations in aggregate economic activities. Some scholars like Amedu (2010), Feldkircher, Horvath, and Rusnak (2014), Griffith-Jones and Ocampo (2009), Jinyong and Yong-Cheol (2013), Maria, Axel, Stefan, and Mark (2015) and Tommaso (2015) believed that monetary policy response should be assigned more weight while others still argue that the fiscal policy should be the most appropriate (Aye, Dadam, Rangan Gupta, & Mamba, 2014; Gianluca, Nathan, & Luca, 2015; Hegwood & Nath, 2014). Yet other researchers have identified understanding and management of external shock as an importance factors influencing economic growth, capital inflows, and aggregate macroeconomic activities as an option (Cologni & Manera, 2009; Hiroshi, 2014; Jinyong & Yong-Cheol, 2013; Obadan, 2012; Obstfeld & Rogoff, 2009; Soto, 2003).

External shocks have been a disturbing scenario to both developed and developing economies of the world. The impact of external shocks can be felt by any economy from both the supply and the demand ends. Researchers like Ahmed and Alih (1999), Berument, Dincer, and Mustafaoglu (2014) and Ikpeze (2010) argued that shocks to

government expenditure and real output should be referred to as internal shocks while shocks to international or foreign reserves, export and import prices should be referred to as external shocks. Furthermore, Aliyu (2010) believed that both domestic and external shocks should be seen as log of obstructions that clog the free implementation of a nation's developmental plan. Similarly, Noy and Nualsri (2008) looked at both external shocks and domestic shocks as one and the same since both serve as divert to target achieving of a nation's developmental attempt. They emphasized that with external shock, countries always finds it difficult to attain their projection in terms of economic development. In his own contribution, Obadan (2006) revealed that external shocks are the occurrence of any hindrance or blockage either domestic or external factors that is not covered by any nation's developmental plan for that fiscal year or determined period of time. He maintained that understanding of external shocks dynamics can be instrumental to addressing fluctuation in aggregate economic activities.

External shocks clog economic growth of a nation via its distraction tendency of manipulation of either the nation's supply or demand or even both. Over the years, implementation of economic policies has been hampered by some of the external shocks variables in Nigeria. In the view of Alley, Asekomeh, Mobolaji and Adeniran (2014), Amedu (2010), Ikpeze (2012) and Obadan (2012), the implementation of the First Developmental Plan, Second Developmental Plan, and Third Developmental Plan was not successful owing largely to presence of different forms of distortions. These scholars emphasized that, the oil price boom of 1978, the Structural Adjustment Programme (SAP) of 1986, the global financial meltdown of 2008, lingering cases of political

instability and the recent oil fracking in the United State of America (USA) really influence both the productivity level and exchange rate position of the economy. They maintained that whether the shock leads to a boost or a burst, as long as provision is not made to accommodate its occurrence in the developmental plan for that period of time, it becomes an external shock.

In their own contribution, Agu (2008), Mayowa and Babatunde (2011) contended that during the Iraq War of early 2001, there was a pull in the demand for Nigerian crude oil which led to a boom shock. Conversely, the global financial meltdown of 2008 affected the supply curve of Nigerian crude oil due to decline in demand. They strongly believed that since oil is the mainstream of Nigeria's economy, these shocks to its demand and supply affect the country's government expenditure, international or foreign reserve, and the degree of her trade openness via their impact on the nation's exchange rate.

1.2.1 The Trend of Exchange Rate in Nigeria

Works on exchange rate trend still remain of interest to researchers, especially in less developed countries, disregarding the existence of immense body of literature in the area. This is largely due to the fact that exchange rate trend in whatever form it has been conceptualized is not only pivotal in relative to price, which links domestic and the global markets for goods and assets, but it also emphasis the competitiveness of an economies' exchange strength vis-a-vis the rest of the world or her trading partners in a pure market structure (Livio, 2015). Similarly, scholars like Mohammad, Chowdhury, Bhattacharya, Mallick and Ali (2014) contended that exchange rate equilibrium serves as a point that guarantees sustainable domestic and global macroeconomic balance over the medium

term to long term. However, there is no exact answer to what determines equilibrium exchange rate, estimating exchange rate trend, the degree of exchange rate and its misalignment remains one of the most disturbing empirical problem in small open economy like Nigeria macroeconomics analysis (Velasco, 1999).

Nigeria had varied experiences with exchange rate regimes; that is flexible exchange rate from 1986 till date with managed flexible exchange period at intervals. But before 1986, Nigeria had practised firmly fixed exchange rate regime. This experience had in most cases led to volatility in the exchange rate, thereby creating an atmosphere of uncertainty which aggravates the problem of macroeconomic imbalance in the country (Obadan, 2010). Understanding that exchange rate is used as a policy instrument in ensuring and to enhance stability of price of both import and export performance thereby regulating the domestic price level. Therefore, it become worrisome for any country to experience exchange rate volatility (Baxter, 1989; Livio, 2015; Mohammad, Chowdhury, Bhattacharya, Mallick & Ali, 2014). These scholars opined that exchange rate regime should be studied in relation to countries peculiarities before adoption. Although, they maintained that flexible exchange rate regime is more realistic to the fixed exchange rate regime.

In 1986 after the official implementation of the SAP policy, exchange rate in Nigeria experienced high level of volatility when compared to years before. The parity ratio of the nation's currency (Naira, ₦) to that of her major trade partners (USA) became so weak. Economic scholar like Obadan (2006) attributed this occurrence to drastic decline

in the domestic industrial productivity growth rate level which led to increased import to argument the domestic consumption gap, poor revenue to finance the nation developmental plan as a result of obvious impact of external shocks like financial crisis, oil price shock, and political instability. He maintained that these occurrence led Nigerian government to divert from implementing the map out development plan which was disastrous to the nation's exchange rate statues. From the study of six Latin American countries, Rodrik (2009) established that there exists a high correlation between adherence to a country developmental plan and countries exchange rate volatility level. In corroborating this position, Jinyong and Yong-Cheol, (2013) and Raddatz (2007) submitted that external shocks is responsible for exchange volatility and that under a volatile exchange rate condition, adhering to a strict implementation of developmental plan is always very elusive.

After the 1986's SAP, the parity ratio of the ₦ depreciates to the currencies of her trading partners, especially USA dollar (USD) and British pound (£). SAP encouraged floating or flexible exchange rate and this continued, though at a varying level, till 1996 when the Abacha's led government introduced dual exchange rate regime (official and parallel market exchange rate) with the view of boosting internal productivity capacity, thus stabilizing the exchange rate level of volatility (Onuorah, 2010). With the return of democracy in 1999, dual exchange rate was dropped for full-fledged flexible exchange rate. Exchange rate experienced volatility during this period again due to increase in political instability caused by political tension and change of leadership which reduced foreign investors' confidence in the country (Aliyu, 2010). In 2008, Nigeria exchange

experience another volatility due to the global financial meltdown. Globally assets, stock and other financial instruments lost their value. This scenario, damped the domestic economic activity, reduced the spending and consumption level in the economy. To meet up with the country's demands, import increased putting pressure on the exchange rate (Mayowa & Babatunde, 2011).

The trend of the Nigeria's exchange rate, it is a replica of the nation's economic performance (Aliyu, Yakub, Sanni, & Duke, 2013). These scholars observed that, during the period exchange rate experienced major volatility in 1986, 1998-1999 and 2007-2008, the country's economic performance was low. This implies that, when there is appreciation in the exchange rate volatility, the economic performance is stumpy and when there depreciation the economy performance is high. They further explained that, as the exchange rate of the country depreciate, the cost of production increases thereby making the production climate hard for the real sector. They maintained that, the nature of Nigeria's import best explain this situation. Most of the raw materials for production were imported. This best explained the difference between Nigeria economy and that of Japanese that even with her devalued Yen the industrial productivity ratio still remain favourable.

Figure 1.1 displays exchange rate trend in Nigeria. The exchange rate trend depicts an upward shooting curve in Nigeria. The volatile nature that has been synonymous with Nigeria's exchange rate has been strongly linked with the incessant present of different externalities. Before 1986, the practised exchange rate regime was the fixed exchange

rate. With the introduction the SAP policy, Nigeria embraced flexible exchange rate where the value of the ₦ is determined by the forces of demand and supply. Nigeria exchange rate experienced some notable milestone of volatility in 1993, 1999, 2003, 2007-2008 and 2014. Although, the exchange rate was not really stable since the commencement of flexible exchange rate regime in 1986, but was within the management level. In 1993 and 1999, the political unrest that followed the annulment of the general election had been held responsible for the volatile exchange rate in 1993 and the fragile confidence in the political situational after the election accounted for the 1999 volatility, respectively. The volatility of 2003 is the aftermath of the Iraqi war and the merger and acquisition (M & A) of the financial institutions in the country with the intention of fortifying their capital base. Exchange rate experience volatility in 2008 in Nigeria due to the financial meltdown (Kodongo & Ojah, 2013).

Similarly, Kumar, Webber and Fargher (2014) opined that global financial meltdown accounted the 2007-2008 volatile exchange rate and the advent of USA reducing her oil importation from Nigeria been a major importer of Nigeria crude was responsible for the 2014 volatility of the exchange rate. Nigeria external trade pattern with her trading partners has not been favourable. Nigeria embark on more importation despite her developmental policy of indigenization as spelt out by SAP in its diversification framework (Alley, Asekomeh Mobolaji & Adeniran, 2014; Olumola & Adejumo, 2006). Observation of different exchange rate policies as a response to external shock has really dealt with Nigeria's quest for growth and development (Mordi, 2006).

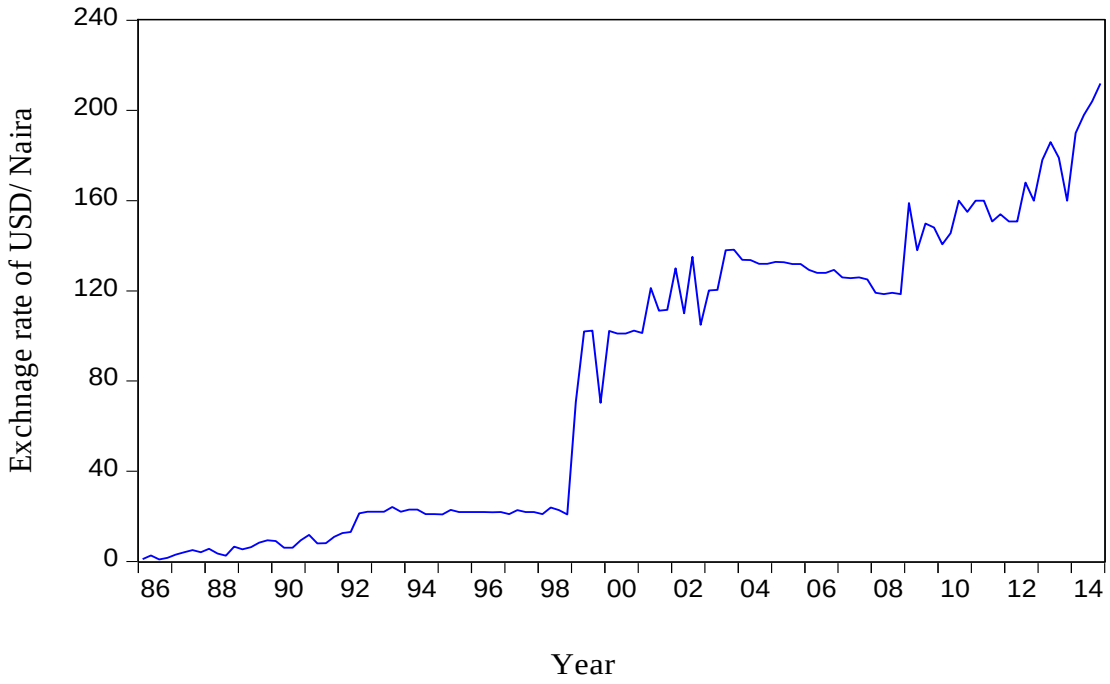


Figure 1.1
Trend of Exchange Rate in Nigeria, 1986-2014

In their own contribution, Ahmed (2003) and Aliyu (2010) observed that, to developing countries, choice of exchange rate regimes might be of a little relevance due to the peculiarity of the problem they are confronted with. They further explained some of the possible problems by citing an example of exchange rate depreciation rather than been expansionary are often of contraction effects in these countries. To them, this implies that one of the key advantages of flexible exchange rate of providing appropriate adjustment mechanism to various kinds of shocks is negated. Flexible exchange rate with effect of devaluations contraction could destabilize, rather than stabilizing the economy. They submitted that this has rightfully explained the Nigeria floating exchange rate regime situation.

1.2.2 External Shock in Nigeria

External shock is the unforeseen circumstance that destabilizes economic package or policy of any country, which is always galvanized by some variables like political instability, financial crisis and commodity price (oil price) shock (Ahmed & Alih, 1999; Berument, Dincer, & Mustafaoglu, 2014; Chunming & Ruo, 2015; Hiroshi, 2014; Jinyong &Yong-Cheol, 2013). In Nigeria like other developing economies of the world, external shocks are functions of variables like oil price fluctuation, financial instability, political instability and natural drought (Obadan, 2010; Raddatz, 2007; Gerlach, 2005). Since the country's independence, Nigeria has witness series of political instability. She has been through the rough fangs of a civil war that lasted for almost three years 1966-1969, activities of regional militancy, weak institutional framework to fight crime and injustice, poor human right record, torture by the state and the present case of Boko Haram insurgency.

All these incidents have a toll on the economy; the GDP has been subjected to an undulated fluctuation (Alley, Asekomeh, Mobolaji, & Adeniran, 2014). These authors maintained that volatile GDP has a direct correlation with the country's purchasing power parity with her trading partner. Crude oil exportation which over the years has taken over as the nation's main export has undergone a lot of price fluctuations as a result of glut in both the demand and the supply. This scenarios of crude oil proceed been the main source of the country's revenue has left the nation's developmental plan implementation at the mercy of what is crude oil price at the international market. This has been the bane of the series of failed and abandoned projects that litter the country (Aliyu, 2009; Alley, Asekomeh, Mobolaji, & Adeniran, 2014; Obaseki, 2002).

Financial crisis has also been held responsible for Nigeria's exchange rate woes. The distortions experienced by the introduction of second tier foreign exchange market (SFEM) and the devaluation of the Nigeria's currency in 1986, the M & A of the country's commercial banks of 2004, the global financial meltdown of 2008 and the crash of the country's stock market of 2006 have a tremendous impact on the country GDP and invariably her exchange rate position (Obadan, 2010, 2012). After the SAP in 1986, the Nigeria financial institutions have to compete with solid based financial institutions of the world. In order to survive, series of sharp practices were observed and which later snowballed into magic or wonder banks in the late 1989. M & A of commercial banks in 2003 and recapitalisation of capital base of banks and other institutions in the Nigerian financial market in 2004-6 as a financial shock, negatively affected exchange rate in Nigeria (Obadan, 2012).

Furthermore, the shocks emanating from political instability in Nigeria can be viewed from the form of political leadership in the country. In Nigeria, of her over 54 years of existence, only 23 years has been under democratic rule while the rest of the years were under military dictatorship. Military eras are periods of uncertainty for general economic activities (Obadan, 2012). He explained that the country keeps experiencing from political sanction to economic sanction of blockage of the country's export produce. Thus, truncating the actualization of her developmental plan. Scholars like Feng (2001) and Thorsten (2015) argued that the pressure of political and economic sanctions has a significant impact on strength of nation's currency. However, Wood and Gibney (2013) argued that it is not the form of government but the function of state in the maintenance

and implementing of the rule of law. They emphasized that if torture, political kidnapping and assassination are perpetuated by the state in respect of the form of governance, there then exist political instability. A situation they opined dampen productivity and invariably encourage volatile exchange rate. This position agreed with a previous work by Aliyu (2010) who submitted that the form of governance is not the sole determinant of political instability but implementation of the ethics of rule of law by the. He submitted that exchange is under pressure during politically unstable situation.

1.2.2.1 Political Instability

There is no unanimous agreement on what can be accepted as a definition of political instability. To some scholars, it is the reign of less participation of majority in governance (Alena, 2008; Aziz, Yoonbai, & Chun, 2012; Thorsten, 2015) while other believe it is the absence of the rule of law, presence of incarceration for venting out of opposing opinion to that of the government, and presence of rampant cases of torture and political murder (Aliyu, 2010; Jong-A-Pin, 2009). However, Amnesty International (AI) viewed political instability as the degree of human, freedom of expression, worship and association that can be exercise in a country (AI, 2013). To them, political instability level is the position a country occupies on their graduated scale of one to five. The higher a country is on the scale, the higher her level of political instability. Nigeria experienced her highest rate of political instability on the scale under the civilian dispensation. Since the inception of Nigeria independence in 1960, attaining stable political environment has been a mirage (Alley, Asekomeh, Mobolaji, & Adeniran, 2014).

The first republic was truncated by a military coup which was followed by a civil war that lasted for three years (1966-1969). According to Ari and José Veiga (2013), investors prefer to invest in countries that have a lower rate of political instability. From their empirical finding, they submitted that political instability encourage a weak exchange rate due to poor productivity climate that it can create. In all, the effect of political instability on the Nigerian economy cannot be over emphasized. The productive capacity of the country is underutilized. Still, proponents of the doctrine that the military regime is synonymous to political instability holds that it was the long year of military intervention in politic that destroyed Nigeria economy. Political instability causes fluctuation of macroeconomics variables and also exchange rate volatility (Amedu, 2010; Ekpeze, 2011). The military ruled for 32 years out of the country's 53years of her independence and during these periods, basic infrastructures that were in place were left to decay and deliberate distortion of the development plan was rampart which has led to the unimaginable fluctuations experienced by the country's exchange rate (Obadan, 2012).

1.2.2.2 Financial Crisis

The term financial crisis is broadly applied to a variety of situations where financial assets suddenly lost large part of their nominal value. In the 19th and early 20th centuries, financial crises were associated with banks panicking and often recessions that coincided with these panics. Other situations regarded as financial crises include the bursting of other financial market bubbles, sovereign defaults, currency crises, and market crashes. Financial crises are phenomena that directly result in the loss of paper wealth but do not necessarily result in changes in the real economy (Dominguez, Hashimoto, & Ito, 2012).

Other scholars like Akinc (2013), Frankel and Saravelos (2012), Lane (2013), Wagner and Winkler (2013) believed that financial crisis is the crashing of financial asset which leads to the paralysis of an entire country's economy for the time of its existence. Many economists like Griffith-Jones and Ocampo (2009), Hausler, (2002), Luca (2015), McKinnon (1988), Reinhart and Rogoff (2008), Todani and Munyara (2005) offered theories on how financial crises developed and on how they could be averted. However, there exist no consensus in their submission on how best to understand financial crisis and also how it can be prevented. Financial crises occur from time to time.

Amedu (2010) submitted that Nigeria has suffered from various type of financial crisis such as speculative bubble, bank crisis and the international financial crises. Like any other developing countries of the world, Nigeria's financial crisis causes serious shock to the economy, by distorting the direction of her stated developmental plan (Bundesbank, 2010; Griffith-Jones & Ocampo, 2009; Leach-Kemon *et al*., 2012; Wagner & Winkler, 2013).

After the implementation of the SAP policy in 1986, there was a general panicking situation in the economy where people were rushing to withdraw their savings and deposits from the bank in Nigeria. This panic seriously affected the banking culture in Nigeria for a long time, for liquidity preference become more pronounce in Nigeria instead of saving or depositing of cash in the bank (Amedu, 2010). Similarly, Onuorah (2010) believed that the panic withdrawals resulted in insufficient deposits to support the real sector. According to him, the impact of this was more pronounced in 1988 where

"miracle" banks emergence was pronounced paying interest rate as high as 70 percent on saving deposits thereby discouraging real time deposits that can encourage meaningful investment in the real sector.

There was stock market crash of 2003 that really hit the foundation of Nigeria's economy. Many industries in the real sector were unable to assess funds from the capital market for long term investment. Many companies folded up, thus giving way to an appreciated exchange rate volatility due to poor level of productivity, depleted foreign reserve, and poor trade openness (Amedu, 2010). The global financial meltdown of 2008 also had a strong negative impact on the nation's economy like other small open economies of the world, as it leads to a poor inflow in terms of capital via direct foreign investment and foreign loans for indigenous industries in different sector of the country's economy (Leach-Kemon *et al*., 2012; Obstfeld & Rogoff 2009). The intermittent occurrence of financial shock has really truncated the Nigeria's developmental plan, thus encouraging the volatility of her currency exchange rate with her trading partners (Onuorah, 2010).

1.2.2.3 Oil Price

From Figure 1.2 and Table 1.1, oil price percentage contribution can easily explain why the shock emanating from oil sector cannot be over emphasized. Despite the diversification attempt in 1986 through the SAP policy, oil sector remained the largest sector of the Nigeria's economy, for it accounted for over 42 percent of the nation's GDP. However, the non-oil private sectors like mining, manufacturing and construction sectors, represents just 4.2 percent of her total GDP. The financial sector is minimal. As

of 2014, Nigeria had earned about USD800 billion from the sale of oil exports since the mid-1970s but her per capita income was 20 percent lower than in 1985. Figure 1.2 shows the trend of oil price in Nigeria.

Oil price had a high command on the nation's development plan implementation. Over 80 percent of the revenue used in running the economy is derived from the sales of oil. There was fairly a stability in the price oil from 1986 to1989, where Nigeria's Bony light crude oil was sold for an average of USD42.4 per barrel. From 1990, there was a steady rise in the price of Nigeria's crude oil, as a result of the increase in the global demand for oil. This increase in price which continues till 1994 saw Nigerian government been able to accomplish some of the items on her developmental plan; like the movement of the federal capital from Lagos to Abuja (Onuorah, 2010).

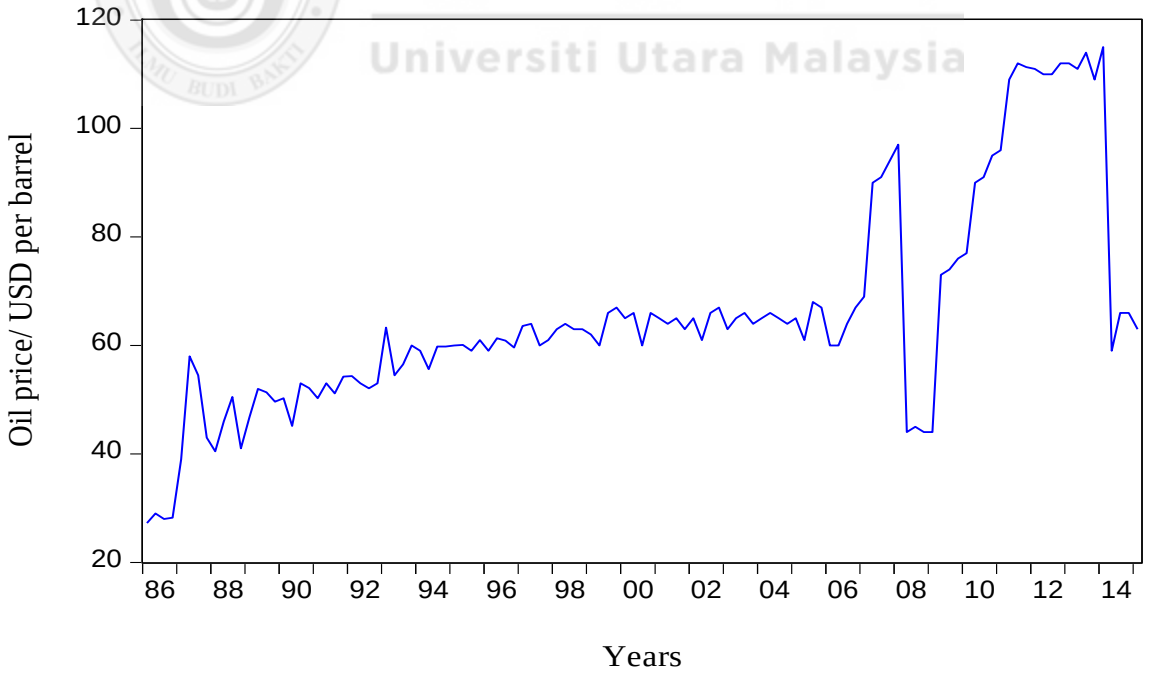


Figure1.2
World Oil Price Trend, 1986-2014

Nigeria experienced a big shock due to a sharp fall in the price of oil at the international oil market in 1985 and also the supply channel experienced a lot of challenge as result of a highly political atmosphere due to the annulment of the 1993 presidential election. The economy is worse-off for this as no meaningful achievement was recorded in the implementation of the developmental plan. Gradually, the price picked up again in 1997 all through to 2008 when the global financial meltdown rocked it down once more (Amedu, 2010). The global oil price gradually recover from the 2008 shock risen to a record height of USD119 per barrel in 2013 only to fall to a record low of USD50 per barrel before the end of 2014 (Atem, Kapper & Lam, 2015; Wensheng, Ronald & Kyung, 2015).

Persistent external shocks and exchange rate fluctuations could potent severe macroeconomic implications, thus inducing challenges for both researchers and policy makers. It create the disturbing problem of aligning to either fiscal or monetary policy confront both product exporting and importing countries of the world (Cashin, Liang & Dermott, 2000; Caruth, Hooker & Oswald, 1996; Hamilton, 2009; Mork, 1994; Kim & Longhani, 1992; Tatom, 1998; Chaudhuri & Daniel, 1998).

In corroboration to the above position Atem, Kapper, and Lam (2015) and Wensheng, Ronald, and Kyung (2015) also believed that, effective application of both the fiscal and monetary policies separately or combined have been challenged by the oil price shock in different countries of the world. They suggested that, rise in external shock reduced output and increased inflation in the 1970s and early 1980s, and fall in external shocks

boost output and lower inflation particularly in the USA from the middle to late 1980s. The channel of transmission through which external shocks have impact on real economic activities has been through the supply and demand channels.

Table 1.1
GDP of Nigeria by Sector at Factor Cost, 2014

Sector	Billions (USD)	% of GDP
Agriculture	11.8	29.2
Oil	17.2	42.4
Manufacturing, Mining and Construction	1.7	4.2
Government produced services	1.8	4.4
Financial sector	0.4	1.0
Trade and private sector	7.6	18.8
Total	**40.5**	**100.0**

Table 1.1 shows that Nigeria as a primary product exporting country, depends majorly on revenue generated from the sale of oil to run her economy. This situation makes the functioning of economic activities to be sensitive to external shock emanating from oil price and exchange rate fluctuations with her trading partner. Since oil serves as her main source of revenue and also, the determinant of relative value of the domestic currency (Aliyu, 2009).

1.2.3 Capital Inflows in Nigeria

Capital inflows usually play an important role on Nigeria's macroeconomic conditions and in particular, on volatility of the exchange rate. Capital inflows surge can finance investment and economic growth, and can also bolster the deepening of Nigeria's oftentimes shallow financial sectors. The fluctuation associated capital inflow, however, may pose significant exchange rate challenges. Notably, the fluctuations in capital inflow in the 1989, 1995 and also in 1999 help greatly in normalizing Nigeria exchange rate appreciation. The inflows of capital as a result of merger and acquisition policy of 2004-

2005 reduces the effect of the global financial meltdown on Nigeria exchange rate if not for some period of time (Aliyu, 2007).

The impact of capital inflows surge on exchange volatility in emerging economies has prompted a renewed interest in academic and policy circles over recent years. Literatures have shown that large capital inflows are associated with a deterioration in the current account, an appreciation of exchange rate, and oftentimes a rapid expansion in credit. The literature has also documented that large capital flows especially those related to 'other non-portfolio investment' flows in the capital account are good predictors of credit booms, and that these booms are more likely to end in credit crunches (Essers, 2013). Contributing to the debate Mendoza and Terrones (2012) and Magud and Vesperoni (2015) looked at the role played by exchange rate volatility in credit booms fuelled by large capital inflows. The latter find that rapid expansions in domestic credit driven by large capital flows are particularly acute in less flexible exchange rate regimes; moreover, these regimes tilt the composition of domestic credit toward credit in foreign currency.

1.2.4 Trend of Capital Inflows in Nigeria

In Nigeria, the trend of capital inflows has always been a cause of worries to the various government. The understanding of the importance capital inflows plays in the actualization of economic growth has pushed the Nigeria government into putting in place policies that can guarantee sustainable inflows of capital (Sani & Sallahuddin, 2015).

Table 1.2

Sectorial Analysis of Capital Inflows (-N- Million) in Nigeria, 1986 – 2014

Sectors	N	Minimum	Maximum	Mean
Manufacturing and Processing	28	5,406.404	229,764.612	63,868.900
Mining and Quarrying	28	810.013	140,497.103	56,011
Agric, Forestry and Fishing	28	134.812	397.213	44.912
Transport and Communication	28	158.211	383.320	587.201
Building and Construction	28	71.212	702.541	129.603
Trading and Business Services	28	1,452.200	23,150.194	13,974.311
Miscellaneous	28	23.714	370.144	873.702

Note: N indicates the number of years span

However, the influence of exchange rate volatility on capital inflows since the inception of SAP, has put actualization of the country developmental plan under perpetual treat (Obadan, 2012). The various economic sectors attractions trend of capital inflows have dwindled during the period of study. Table 1.2 present a descriptive statistic of sectorial capital inflows attraction for the period of study.

Tables 1.2 indicates that the manufacturing and processing sector was the most highly favored by the net inflows of capital during the period of study. The minimum capital inflows to the manufacturing sector is ₦5, 406.4, the maximum was ₦229, 764.6 and the mean was ₦63, 868.900. This result is in conformity with (Fabayo, 2003) and Sani, Yusuf, and Maji (2016) that over the years, the trend of capital inflows into the manufacturing sector is more than other sectors of the economy. The minimum capital inflows to the mining and quarrying sector is N810.0, the maximum was ₦140, 497.1 and the mean was ₦56, 011.0. These statistics placed the mining sector as the second highest beneficiary of the capital inflows within the period under review. Similarly, agricultural sector got the least average of capital inflows followed by the construction sector, while

the manufacturing and processing sector topped the table among the sectors as shown. In other words, the trend of capital inflows in the country during the period of study, construction sector is the third least preferred of the sectors. The inflows of capital in these sectors: manufacturing and processing, mining and quarrying, and miscellaneous were significantly greater than that of the construction sector. The trend of inflows of capital into trading and business services was also greater than that of the construction sector but insignificantly. The minimum capital inflows to construction sector is ₦71.2, the maximum was ₦702.5 and the mean was ₦129.6. Although, the capital inflows into construction sector was greater than that of the transport and communication and the agriculture sector.

1.3 Problem Statement

The aspiration of any economy in the world is to attain an enviable economic development status. Consequently, different countries have put in place different developmental plans in the form of policies and ways of actualizing the desired state. In Nigeria, over the last four decades, policies put in place to actualize an enviable economic growth have been humbled by the operations of some macroeconomics parameters. Researchers and scholars have identified many of the antecedents to the non-implementation of a country's developmental plans. From the review of extant literature, example of antecedents to non-implementation of developmental plan include: exchange rate fluctuations, external shocks, and capital inflows (Aisen & Veiga, 2013; Alena, 2008; Alley, Asekomeh, Mobolaji, & Adeniran, 2014; Amino & Van Norden, 1995; Broda, 2011; Gbesola & Garba, 2014; Hall, Hondroyiannis, Swamy, Tavlas, & Ulan,

2010; Hooper, & Kohlhagen, 1978; Kiptui & Kipyegon, 2008; Obadan, 2012; Velasco, 1999).

In literature, substantial amount of research has been conducted on the relationship between current exchange rate volatility and its conditional volatility in periods ahead. Theoretically, scholars have argued that an understanding and management of the behaviour of the current exchange rate volatility on the conditional volatility in the period ahead would lead to a proper implementation of the country's developmental plans. Nevertheless, available empirical evidence of the limited studies on the relationship between conditional exchange rate volatility in the period ahead and current exchange rate volatility are inconclusive. For instance, study conducted by Alley, Asekomeh, Mobolaji, and Adeniran (2014) confirmed a significant positive relationship between exchange rate volatility and its conditional volatility in the period ahead. On the contrary, Obadan (2010) found a significant negative relationship between conditional exchange rate volatility in the period ahead and current exchange rate volatility. Thus, there is a need to further examine the relationship between conditional exchange rate volatility in the period ahead and current exchange rate volatility.

Generally, scholars have argued that a country's exchange rate becomes volatile whenever there are external shocks such as financial crisis, political instability, and oil price fluctuation. This is true in the case of Nigeria. Over the years, financial crisis is one of the shocks that have been held responsible for exchange volatility in Nigeria. In 1986, after the implementation of the SAP, the increase in the transfer of deposit in Nigeria

banks to banks in other countries with stable currency value, put pressure on Nigeria's exchange rate, thereby making it to be volatile. Similarly, in 2004 and 2006, the (M & A) policy of the Nigerian government via the Central Bank of Nigeria aiming at fortifying Nigerian banks capital base created panic among depositor and even the operators in the banking industry. This panic shocked the exchange rate which consequently led to its volatility.

The global financial crisis of 2008 also impacted on Nigeria's exchange rate volatility. However, several attempts have been made to curtail this shock based on submission and recommendation of researchers and scholars but its effects persisted. Therefore, applying the findings of these studies to Nigeria economy becomes difficult since most of these findings are either based group studies, regional or cross section with little or no consideration of Nigeria as a case study. Thus, there is a need to study the relationship between financial crisis and exchange rate volatility in Nigeria with the intention of finding the cause and effect and prefer recommendation of how best the situation can be handled.

Furthermore, the political atmosphere in Nigeria can be described as being unstable since independence in 1960. Military rule characterized governance of the country between 1966 and 1998, and this had and still have a lot of implications, especially on Nigeria's exchange rate (Fosu, 2001; Mba & Chukwu, 2013). The political tension that arose after the annulment of the 1993 general elections, the 1999 political transition, the militancy operation, and the Boko Haram insurgency have led to high level insecurity, and this

affects the level of confidence that both indigenous and foreign investors have in the Nigerian economy (Mba & Chukwu, 2013).

The lack of confidence in the economy has led to massive capital outflow, thereby putting the country's exchange rate under pressure. Based on research recommendations, series of economic policies like rehabilitation, reconstruction and reintegration policy of 1971, granting of amnesty to militant policy of 2011, massive recruitment, overhauling of security operative condition of service and equipment policy of 2012 and the reconciliation and resettlement talk with the Boko Haram sect in 2014. The failure of all these attempts to yield positive impact on the economy has put the country's exchange under continuous pressure which gives rise to the need for further understanding of political crisis and exchange rate volatility relationship and to present a comprehensive conclusion on how best the relationship can be understand and be handled.

Additionally, Nigeria economy depends largely on proceeds from the sale of her crude oil as the oil section contributes more than any other section in Nigeria in terms of revenue generation. Oil price fluctuation is been argued to be one of the external shocks that are responsible for exchange rate volatility in Nigeria. The oil price glut of early 1980, the oil price crashed of 2003 as a result of the Iraq's war of 2001 and the global financial meltdown of 2008, respectively and the 2014 drop in the global price of crude oil have tremendously put pressure on Nigeria's exchange rate, and consequently, exacerbated its volatility. Nigerian government has put forward palliatives measures to cushion this effect based on research recommendations but this scenario keep persisting. The

diversification policy of the economy in 1986 by the federal government, the SAP policy, and the National Economic Empowerment Development Strategy (NEEDS) policy were all intended to avert the pressure asserted on exchange rate by the fluctuation effect of oil price. Sadly to note this problem of oil price exacerbating the exchange rate volatility still exist. This situation create a need for further research into the understanding of the relationship between oil price and exchange rate volatility in Nigeria with the view of providing recommendation that will serve as far reached solution.

In Nigeria, foreign capital inflows has also been viewed as one of the factors that explain the behaviour of exchange rate of the country. Nigerian government put in place series of policies in line with scholars and researchers submission on how best foreign capital inflows can be encouraged and utilised to avert the occurrence of exchange rate volatility. For example, in 1986, with the introduction of SAP, there was a rapid inflows of foreign capital which was believed to help tremendously in the management of exchange rate volatility. Also with the liberalization of the Nigeria petroleum downstream sector in 1988 and 1989, the banks recapitalization of 2004 and the merger and acquisition policy of 2006 all saw the massive inflows of foreign capital yet the problem of exchange rate volatility still persist. The scenario facilitate the need for more study to give an in depth understanding of the relationship between capital inflows and exchange rate volatility.

The nexus of relationship between external shocks, foreign capital inflows and exchange rate volatility on the productivity level in Nigeria has been a cause of worries to many researchers and policy-makers. In Nigeria, increase in rate of external shock and volume

of foreign capital inflows in the form of Foreign Direct Investment (FDI), remittance and aids have a significant influence on the country's gross domestic product (GDP), government expenditure or spending, foreign reserve (FR) and trade openness (TOP). The quest for a favourable and enviable economic growth position has made the Nigerian government to embark on series of policies as mentioned earlier but the situation remain still worrisome.

In summary, while a lot of policies have been implemented based on submission of studies which have investigated separately the relationship between exchange rate volatility, external shocks (financial crisis, political instability, and oil price fluctuation) and capital inflows but the situation is still worrisome in Nigeria, there is a need to study the relationship from an aggregate perspective. Nonetheless, there is a paucity of study that examines holistically or on aggregate level the relationship between exchange rate volatility, external shocks, and capital inflows which might be responsible for the poor response of the policies based on their submitted recommendations in Nigeria. In view of this, this research choose to address this situation by asking the following research questions.

1.4 Research Questions

From the problem statement section, critical issues which bother on the relationship between exchange rate volatility, external shocks, and capital inflows have been raised. In order to address these issues, the following research questions are posed:

i) Is there a relationship between the current exchange rate volatility and its conditional volatility in other periods ahead in Nigeria?

ii) Do external shocks have a significant impact on exchange rate volatility in Nigeria?

iii) Does exchange rate volatility have a significant effect on capital inflow in Nigeria?

1.5 Research Objectives

The general objective of this study is to examine the relationship between exchange rate volatility, external shock, and capital inflows in Nigeria. The specific objectives are as follows:

i) to ascertain the relationship between the current exchange rate volatility and its conditional volatility in other periods ahead in Nigeria.

ii) to estimate the impact of external shocks on exchange rate volatility in Nigeria.

iii) to examine the effect of exchange rate volatility on capital inflow in Nigeria.

1.6 Significance of the Study

The relationship between exchange rate volatility, external shocks and capital inflows has been over looked in the existing empirical literature in Nigeria maybe due to the fact of unavailability of data despite the fact that Nigeria's economy dependent on the developments in the global community. Also, as a country that depends on mono-export revenue to finance her economy, it is very pivotal for an unlimited literature existence.

Nigeria's underlying current account balance is a function of three major determinants, "its oil exports, priced at a sustainable long term trend value; the competitiveness of its non-oil exports; and the pace of capital inflows to the country from foreign sources".

Nigeria's balance of payments have been subjected to a high degree of fluctuation caused by: political instability; in the form of security challenges and the financial instability which has dampened the nation's export (Alley Asekomeh, Mobolaji, & Adeniran, 2014; Amedu, 2010). The fluctuation in government spending, due to upsurge of import payments for capital projects, present of external shocks and increase in capital flight resulting from periodic exchange rate uncertainty are swings that are difficult for predictions. Although, they can have significant impact on monetary expansion and the exchange rate level. The attempt at identifying these uncertainty dynamics of exchange rate makes this research of immense significant.

Literature has shown that external shock affect exchange rate volatility for USA, Germany and Japan but there is a paucity of research conducted in Nigerian context. Many studies used cross-country regression to study the link between exchange rate volatility and macroeconomic activities of various countries. The result of cross-country regression is prone to be biased as a result of the heterogeneous nature of data obtained in less developed countries (Reinhart & Rogoff, 2004). Most of the studies like Aziz, (2009), Elder and Serletis, (2010), Hamilton, (2009), Jin, (2008), Wang, Hu and Wu, (2012) reviewed, used oil as the only variables representing external shock and on oil importing countries.

These create a need for this study that uses country-specific regression to determine the impact of external shocks on exchange rate volatility in Nigeria. The ability of the models used in this research to determine conditional volatility of current exchange rate and to

trace the relationship between exchange rate and the domestic and foreign goods current prices and its period's ahead conditional volatility makes this study very important and will help to ginger a policy debate in the area. This is equally very vital for policy forecasting and adjustment, especially in this era where every country is aiming at economic development target rules.

Basically, this research is significant because of its contribution to both literature and policy making processes in Nigeria. The research contribution to both literature and policy can be summarized as follows; the study significantly contribute to the existing literature on exchange rate volatility, external shock, and capital inflows nexus in Nigeria. It explained the relationship between current exchange rate volatility and its conditional volatility in other periods ahead in Nigeria using EGARCH method. Also, using the aggregating eternal shock variables to analyze the relationship with exchange rate volatility instead of the disaggregated approach and the ARDL to estimate the impact of external shock on exchange volatility in Nigeria. The study incorporating exchange rate volatility as a function of capital inflows in Nigeria.

On the other hand, the study put forward an opening for Nigeria government to come up with policies that would address the lingering problem of current exchange rate volatility. Also, it provide a direction on how to proffer solutions to the research on external shock variables problems with the intention of solving exchange rate volatility problem in Nigeria. Finally, it provide better understanding on how capital inflows can be use as an antidote to exchange rate volatility problem in Nigeria

1.7 Scope of Study

This study is on exchange rate volatility, external shocks capital inflows in Nigeria. It focuses on the pattern of exchange rate volatility, relationship between exchange rate volatility and the various types of external shocks (financial crisis, political instability and oil price fluctuation) and impact of exchange rate on capital inflows. The computed value of exchange rate volatility is investigated to answer objective one of the study. Also, the selection of this topic is due to the availability of the essential data and it's important. External shock variables namely; political stability, oil price fluctuation and financial instability would be subjected to empirical analysis in other to answer the stated research question two. Research question three will be address by the use of control variable and exchange rate volatility on capital inflows. The examination of the efficacy of the studied variables will assist the researcher to proffer suggestions on which of the parameter is more shock-driven and ultimately growth-driven. This study is limited to Nigeria within the period of 1986 to 2014 (29 years).

1.8 Organization of the Study

The study will be organized into five chapters. Chapter 1 introduces the theme of the study, problem statement, research questions, objectives of study, significance of study, scope of study, and finally organization of study. Chapter 2 which is literature review will cover both conceptual and empirical literature and conclusion of the chapter. Chapter 3 will discuss research methodology; theoretical framework which are the theories that underpin the research, model specification and justification of variable, source of data and method of analyses. Chapter 4 covers discussion of results. Chapter 5 is the

Conclusion and the last chapter is concerned with summary, conclusion and policy implications and suggestion for further studies.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter focuses on review of both theoretical and empirical literatures. More precisely, while Section 2.1 is this introductory part of the chapter, Section 2.2 and Section 2.2.1 deal with concept of exchange rate and measurement of exchange rate respectively, Section 2.3 explains determinants of exchange rate. Section 2.4 presents theories of exchange rate while Section 2.5 looks at concept of exchange rate volatility and Section 2.6 discusses concept and determinants of external shocks. Section 2.7.1 explains the relationship between exchange rate volatility and external shocks. Section 2.7.2, Section 2.7.3, and Section 2.7.4 explain exchange rate volatility and political instability, exchange rate volatility and financial crisis, exchange rate volatility and oil price, respectively. Section 2.8 presents exchange rate volatility and capital inflows. Section 2.9 discuses gap of the study. Finally, Section 2.10 concludes this chapter.

2.2 The Concept of Exchange Rate

Exchange rate express a nation's currency quotation in relation to foreign nations currencies (Josef, Dilhan & Daniel, 2015). For example, if USD1 is worth ₦200, then exchange rate of a USD to Naira is ₦200. If a product costs ₦600, it automatically costs USD3 as a matter of accountancy. Going by this hypothetical illustration, it therefore means that Nigeria's GDP of ₦2 million would be worth USD10 thousand. Thus,

exchange rate can be a conversion ratio factor between ₦ and USD depending on direction of conversion.

Opinions varies on how exchange rate can be defined by scholars and policy makers alike. In literature, divergent views are bound on how best the concept of exchange rate can be defined. Exchange rate is seen as a price paid for assets between two countries that are involved in monetary transaction. If exchange rate can move freely, it can be used to assess movements of goods and services across bounder of nations. Also, exchange rate may be seen as volatile price in an economy, bridging currencies of nations into easy understanding in terms of business transactions (Hausmann, Panizza, & Stein, 2001).

According to Amir (2013), Bergvall (2004) and Pascal and Sebastian (2013) in their various submissions opined that, exchange rate is defined as the meeting point of currency of two or more different countries in an international economic dealing or trading transaction. These scholars separately believed that exchange rate can be seen as the acceptable amount that currencies of countries that are involved in trade with one another can be exchanged. In their own contribution, Bundesbank (2010) and Gnimassoun (2015) linked exchange rate with purchasing power parity of a country currency with currencies of her trading partners. These authors emphasized that it is the rates at which a particular country currency can be explained by currency of her trading partner been measured on a standardized scale.

Also, Mandelman (2013) and Von Hagen and Zhou (2002) in their own contribution from a separate research submitted that exchange rate is what a unit to unit ratio of one country currency can afford in another country's market. They argued that, at a going rate, the acceptability unit to unit ratio of a country currency in obtaining goods and services outside its domicile country should be referred to as exchange rate. Sfia and Mouley (2009) believed that exchange rate is a function of what a nation's currency weighs on the international gold standard when compared to other currencies using the same standard for currency valuation. Azid (2005) and Dudley (2014) at differently researched period defined exchange rate as the strength of a nation's currency vis-a-vis currency of other economy in relation to its strength in value of purchase.

Despite the above controversy on what should be referred to as exchange rate, there is a common point of agreement in all the reviewed literature. They all agreed that exchange rate relates to the strength or level of appreciation of any country's currency outside the currency domicile country in respect to economic or business transactions.

2.2.1 Measurement of Exchange Rate

Exchange rate can be measured either by nominal exchange rate (NER) or real exchange rate (ER). NER is exchange rate that existed on currency in a foreign exchange market. Also, Von Hagen and Zhou (2002) opined that NER usually exist in continuous quotations, with newspaper reporting their daily quotations, and a country's central bank can also fix NER. These scholars believed that it is just the going rates of a country's currency devoid of the currency strength over time. In addition, Olugbenga and Oluwole

(2011) viewed NER as exchange rate that does not recognize the influence or impact of inflation over time.

On the other hand, Bjorken and Brook (2002) define ER as NER corrected with inflation measures. For instance, if country A's inflation rate is 10 percent and country B's inflation rate is five percent, assuming no change take place in both countries NER. These scholars posited that country A would have a currency whose real value is 10 percent when you minus 5 percent, this will give you five percent higher than before. To them, higher prices mean an appreciation of the ER, all things being equal. It implies that ER explains in detail the true strength of a country's currency. In their view, Olugbenga and Oluwole (2011) believed that ER actually explains in detail the strength of an economy currency. They maintained that ER is the NER that recognizes the reality of the strength of a currency in relation to time and inflation rates.

Furthermore, exchange rate can also be classified according to the number of currencies under consideration. It can be multilateral or bilateral exchange rate. Bilateral exchange rate clearly deal with two countries' currencies. They are usually outcome of the match between demand and supply in financial markets transactions. In the latter case, the central bank usually acts as an agent in one of the sides of the relationship. Bilateral exchange rate can simply be computed from triangular relationships: if the exchange rate of USD/₦ is 200 and USD/ Ringgit (RM) is RM3 then, as a matter of computation, one RM1 is worth ₦66.67. No direct ₦/RM transaction needs to take place. If, instead, a financial market exists for Ringgit to be exchanged for Naira, expectation is that actions

by speculators (arbitrage among markets) will bring parity of ₦66.67 Naira per Ringgit as an effect.

Multilateral exchange rate is computed in order to judge general fluctuation of a country's currency toward the rest of the world. Joseph (2011) in his study explained that having a basket made up of 60 percentage USD and 40 percentage German marks, a currency that suffered from a value loss of 20 percentage in respect to USD and 30 percentage to German mark can be said to be facing "effective" loss of 26 percentage to the two currencies, respectively.

In corroboration to the above opinion, Levy-Yeyati and Sturzenegger (2005) observed that some countries use more than one exchange rate, depending on type and subjects of transaction. Multiple exchange rate then exist when referring to commercial versus public transactions or consumption and investment imports. However, this situation requires some degree of capital controls. In many developing countries, beside the official exchange rate, black market offers foreign currency at another price, usually much higher exchange rate.

Joseph (2011) defined exchange rate regimes as official recognition of a particular regime of exchange rate in use in a country at a particular time. It can be pegged/fixed or float/flexible or even the combination of the two. He further explained that, in any situation that the exchange rate move freely and assuming any value that demand and supply jointly established is referred to as freely floating exchange rate or flexible

exchange rate. Also, if a country apex bank intervenes in currency market, a managed floating exchange rate regime takes place. The apex bank's intervention can have an explicit target. In flexible and managed floating regimes, a loss in currency value is referred to as depreciation whereas an increase in currency's international value is termed appreciation. If exchange rate for a USD/₦ rises from ₦200 to ₦250, it has shown an appreciation of 25 percent and the Naira has depreciated by 12 percent.

In addition, central banks can also declare a pegged or fixed exchange rate, offering to supply or buy any quantity of domestic or foreign currencies at that rate. This is called fixed exchange rate In fixed exchange rate regime, a loss of currency value, usually forced by market or a purposeful policy action, is referred to as devaluation, whereas an increase in international value of a currency is a revaluation (Jin, 2003).

Different countries of the world embanked on exchange rate regimes or policies that meet up with the demand and peculiarity of their economies. However, economists and policy makers have not agreed on the most appropriate regime or policy of exchange rate. Von Hagen and Zhou (2002) posited that in different countries of the world, different types of exchange regimes are always adopted and in most cases as a reflection of ideology of the country. In some countries, more than one type of exchange rate regime can be observed at the same time.

Friedman (1953) believed that floating rates allow rapid change in relative prices between countries. He emphasized that an increase in the exchange rate makes domestic currency

cheaper in terms of acquiring foreign goods, even though their prices back home remain the same. This means foreign goods become expensive at home leading to less export and more import. This understanding leads to two assumptions. One that, goods prices at home country are constant and two buyers of goods have a reasonable pass through in exchange rate. He also posited that if market price react quickly to any disturbance, exchange rate regime would matter less. He argued that, "if internal prices were as flexible as exchange rate, it would make little economic difference whether adjustments were brought about by changes in exchange rate or by equivalent changes in internal prices. But if this condition is clearly not fulfilled at least in the modern world, internal prices are highly inflexible".

Contrary to Friedman's position, Reinhart and Rogoff (2004) submitted that monetary issue determined the choice of exchange rate regime. They maintained that, relative price behaviour is usually independent of monetary regime in a world of perfect goods price flexibility. Blomberg, Frieden, and Stein, (2000) and Bubula and Otker-Robe (2002) separately posited that going market prices are constant in the domestic currency of producer therefore, price for consumers changes on basis of one-for-one in the short-run with changes in NER.

Furthermore, concerning the right regime of exchange rate, opinions also differ from the traditional idea of Friedman in line with the position of the credible cum discipline school of thoughts and the revisionist school of thought. The credible cum discipline school of thought posited that fixed exchange rate should be encouraged based on the aftermath of

the Asian crisis. They posited that one can presumably import sound monetary policy by fixing domestic currency value to a hard-money currency country if one cannot build it at home. Advocates of this school of thought like Calvo and Reinhart (2002) argued that a fixed exchange rate is an explicit contract in which a country apex bank commits to retaining peg until any unspecified but painful factor kick-in. Obstfeld (1997) opined that process of devaluation should not be a careless decision to be embarked upon by government and its feasibility is use of fixed exchange rate which makes devaluation an unthinkable easy option.

In addition, this school of thought also argued that fixed exchange rate lead to much needed discipline in exchange rate affairs using both the monetary and fiscal policy. In support of this position, Bleaney and Francisco (2007) argued that the conventional understanding of flexible exchange rate ignores explanation that it advanced fiscal indecision and careless economic behaviour which have high economic cost on the economy.

Opposing this position, the revisionist maintained that flexible exchange rate induce discipline in fiscal policy. Accordingly, Zalduendo (2006) one of the apologist of this idea explained that Venezuela's fiscal policy experience high level of prudency after flexible exchange rate was used to control host factors. After studying fiscal policy of some sub-Sahara African (SSA) countries, Broeck and Slok (2006) submitted that some francophone countries that enforced fixed exchange rate seem to have exhibited less

fiscal discipline which underscored the position of credible cum discipline school of thought.

2.3 Determinants of Exchange Rate

Numerous factors have been postulated as determinants of exchange rate. All these factors are link to trade relationship between two or more countries. Exchange rate is usually viewed as a relative expression of two countries' currencies behaviour understanding (Aliyu, 2009). Some obvious determinants of exchange rate between two countries has been postulated by researchers and policy makers alike as can be explained below are shocks to terms of trade, government expenditures, capital inflows, level of productivity (GDP), international reserve, and degree of openness in trade.

Country's structural exposition to external shock variables (political instability, financial crisis and oil price fluctuation) has been figured out as determinants of exchange rate. Scholars that supported this position believed, that level of political stability explain how exchange rate movement behaves. Goldstone *et al*., (2010), Blanco and Grier (2009) and Hoffminister and Roldos (2001) in their various submission observed that political stability is a strong determinant of a nation's exchange rate. Goldstone *et al*., (2010) using a causality effect in testing deterministic tendency of political stability on Cuba and Argentina exchange rate, reported that among other variables, exchange rate behaviour is influenced by political stability. Dibooglu and Ali (2001) and Jin (2003) posited that foreign investors seek for politically stable countries with strong market potentials to invest their capital. This implies that countries with stable political situation and strong

market potentials will attract investors. With this understanding, they believed that country's exchange rate can be determined by the level of her political stability among other things.

In the same vein, the opposite of this condition, which is political instability causes loss of confidence in a country's security, subsequently gives room for the diversion of investment to countries with stable political situation or condition. Berkmen, Gelos, Rennhack and Walsh (2012) believed that financial crisis as a form of or type of external shock has a strong influence on exchange rate. They emphasized that global financial crisis was responsible for exchange rate volatility of many countries during the global financial meltdown of 2008. Berument and Sahin (2014) submitted that oil price is a strong determinant of exchange rate. Turhan, Sensoy, and Hacihasanoglu (2014) observed a strong relationship between exchange rate and oil price fluctuation. From the above it can be established that relationship exist between the various composite of external shock selected for this study and exchange rate. In the overall analysis, these variables of external shock distort country's term of trade and thereby putting countries currency under pressure since import will be encouraged as a result of low internal productivity.

The distribution of government expenditure between tradable and non-tradable goods, at the same time the effect of government expenditures depend partially on the Balassa Samuelson hypothesis that exchange rate volatility is fully income effect (primary effect) and secondarily a substitution effect (Ravan, *et. al.*, 2007). In his studies, Edward 1989

found that the increasing of public expenditures causes an appreciation of the real exchange rate. Also, Velasco (1999) submitted that constant increase in government spending leads to an appreciation of the equilibrium real exchange rate in the long-run. While government expenditure is often expended on non-tradable products, thus an increase in government spending imply a pressure on the relative price of non-tradable goods, which in response increases domestic demand, thus given rise to an appreciation in exchange rate volatility. More so, if government expenditures were on tradable products, fiscal balance would reduce thereby causing depreciation of exchange rate volatility. Soto (2003) investigated the effects of government expenditure on exchange rate volatility using panel structural VAR analysis and data from four industrial countries. The authors submitted that an increase in government expenditure leads to a depreciation of the real exchange rate volatility. However, Reinhart and Rogoff (2004) opined that government spending have a positive impact on the exchange rate.

According to the classical school of thought right from the time of Adam Smith, Ricardo and Say believed in the existence of a direct correlation between exchange rate and foreign capital in domestic economy. They argued that an increase in the level of foreign capital leads to or guarantee increase in level of exchange rate stability. They argued of that there is existence of a positive relationship between exchange rate stability and growth in foreign capital. Some scholars are of the opinion that capital inflows determined stability level of country's exchange rate (Aisen & Veiga, 2013). These scholars believed that when investors invest their capital in a state thereby encouraging economic growth which reduced pressure on imports.

Hau (2002) considering the behaviour of some selected Latin America countries posited that capital inflows (foreign capital) is one of the strong determinants of exchange rate. He explained that increase in capital inflows will increase their security of production which also increase the enthusiasm of the investors as a result of security on investment, which, in turn, increase inflow of foreign investment and level of exports. The increase in internal productivity reduce pressure on demand for foreign substitute, and consequently, reduce pressure on exchange rate. Based on his finding, he maintained that positive relationship exist between capital inflows and exchange rate. Imed and Christophe (2001) considered the endogenous borrowing constraints in some Asian countries in their study believed that capital inflows determine exchange rate directly. In buttressing their position, they emphasized on the effect of the pass-through between exchange rate and foreign capitals and submitted that influence of cost of borrowing to countries with weak foreign reserve constraint effect the behaviour of exchange rate.

Furthermore, scholars like Baldawi, Skudeiny, and Tadlioni, (2005), Botha and Pretorius (2009), Flamini (2004) in their separate studies observed that relationship between capital inflows and exchange rate is monetary policy intermediation. That transitive relationship exist between exchange rate and foreign capital inflows. They individually submitted that capital inflows determine exchange rate as a backup to support productivity in the advent of a shock. They believed that high capital inflows argument foreign reserve thereby making exchange rate to be stable.

Difference in the level of gross domestic product (GDP) in two countries has been identified as one of the determinants of exchange rate fluctuation. Even though, its absolute deterministic tendency is inconclusive. Aliyu (2009) submitted that, as a general rule, a country with a consistently high production rates have a high currency value. He maintained that such country's currency command stable exchange rate compared to other currencies because of low level of importation. He explained that USA, Japan, Germany, Canada and Switzerland experienced high production or GDP rate, which explained the stable nature of their exchange rate respectively. The countries with higher GDP, experience more stable exchange rate in relation to those with poor GDP rate. In support of the above line of argument, Al-Samara (2009) reported that exchange rate is strongly influenced by a nation's GDP rates in both short and long run. He emphasized that country's GDP rate affects the quantity of trade among countries. He maintained that the volume of trade have a strong correlated to the exchange rate parity with other things remaining constant.

Although, some scholars found a positive relationship between level of internal productivity (GDP) and exchange rate, however, other studies found a negative relationship. Juthathip (2009) conducted a research on the determinants of exchange rate and reported a negative relationship between GDP and exchange rate. He maintained that, some countries have very high GDP rate yet their exchange rate remain unstable. He argued that not just what you produced but the market for your product is an important determinant or the link between exchange rate and GDP. In their own contribution, Ricci, Milesi-Ferretti and Lee (2008) analysed GDP structure in Mexico and submitted that

GDP has a negative relationship with Mexican exchange rate. In their analysis, GDP maintained a continuous rise within the period but exchange rate weaken or fluctuate. They submitted that instead of increase in productivity leading to less pressure on the nation's currency it increase its volatility. This means it does not influence the behaviour of exchange rate positively. Even though a conclusion has not been reached in the deterministic position of exchange rate by GDP, it has been established that GDP influenced exchange rate whether positively or negatively.

Even though, there is no conclusive position in the acceptance of foreign reserve as a determinant of exchange rate, evidence to support its non-influence on exchange rate are weak on the grounds that their submissions, cannot debunk that role it has played as a buffer in stabilizing many developing countries economy (Kohler, 2010). Additionally, Bergvall (2004) posited that foreign reserve growth rate has been a major factor in pacifying the impact of global shocks to exchange rate. He explained the role it plays in stabilizing exchange rate for countries with strong foreign international reserve doing the recent global financial meltdown. Countries with weak foreign reserve exchange rate were worst hit by the shock since they cannot rely on much reserve to argument the financial gap thereby exposing their economy to the danger of the shock. He believed strongly and maintained that with a defined difference in the foreign reserve among countries, there must be an existence of exchange disparity. He emphasized that exchange rate and foreign reserve are highly correlated, thus manipulation of foreign reserve by a country apex banks exert significant influence on exchange rate behaviour.

Hausmann, Panizza and Stein (2001) posited that trade openness between countries and their trade partners, showing all payments between the countries for dividends, interest, goods and services. A deficit in the current account reflects the country is spending more on foreign trade than her earning, and that she is borrowing capital from foreign sources to make-up the deficit.

Furthermore, scholars in field of economics have divergent views on public debt as a determinant of exchange rate. Schneider (2004) believed that even countries that have notorious financial recklessness history still attract foreign securities. He maintained that countries like USA that has a record of world debt has a fairly stable exchange rate when compared to some countries that have less debt owing countries like Saudi Arabia. Thus, to him, public debt is not a determinant of exchange rate. On the contrary, scholars like Farzennegan and Markwardt (2009), Husain and Rogoff (2005), and Kamin and Roger (2000) believed that countries engage in large-scale deficit financing to execute public sector projects. Since such projects stimulate the domestic economy, they are less attractive to foreign investors. Country with large debt prove worrisome to foreign investors for they believe such country risks defaulting on her obligations. Foreign investors frowned at owning securities in currency that risk of default is high. They submitted that the country's debt rating is a crucial determinant of its exchange rate.

In literature, positions vary on the deterministic nature of exchange rate by trade openness. Economists like Hausmann, Panizza and Stein (2001) posited that trade openness explains the removal of all impediment to the free flow of trading activity

among the concerned countries. He maintained that it is the ratio of total trading and the GDP of a country. Trade openness encourage inflow of capital thereby encouraging productivity. He submitted that trade openness is negatively related to exchange rate. Similarly, Bown and Crowley (2014) opined that a positive relationship exist between exchange rate stability and trade openness.

Similarly, Abeysinghe (2001), Bachmeire (2008) and Calvo and Reinhart (2002) believed that, trade openness is a ratio of total export prices plus import prices and the GDP. It is related to total recipient from trade by a country. They believed that, if a country's degree of trade openness rises, then exchange rate stability or close stability is assured. Increasing trade openness reflect greater demand for the country's exports and less import. This results to increase in revenues from exports and increased demand for the country's currency (appreciation of the domestic currency). Bachmeire (2008) submitted that, if trade openness decreases, the currency's value will decrease in relation to her trading partners thereby, exposing her currency to pressure of fluctuations. In a previous study, Calvo and Reinhart (2002) reported that trade openness is one of exchange rate determinant but not in all countries. From their finding, in some of the studied countries like Brazil and Argentina, exchange rate is been determined by the countries trade openness while in others like Columbia and Mexico trade openness has no impact on their exchange rate level. Abeysinghe (2001) posited that, country trade openness strongly determine the country’s exchange rate. He emphasized that the favourable is a country’s level of trade openness, the stronger the exchange rate value. Based on his

finding on some selected SSA countries, he concluded that, trade openness galvanize the behaviour of exchange rate.

2.4 Theories of Exchange Rate

Series of theories have been postulated by different scholars at different time to explain the operation of exchange rate. Friedman (1953) argued that floating or flexible exchange rate could allow rapid relative prices change in between countries. He believed that rise in exchange rate makes foreign goods cheaper in home currency, although their prices remain constant in the producer's currency. The domestic goods become expensive in terms of foreign currency, even when their prices are the same in terms of domestic currency. This tends to increase imports and reduce exports. He submitted two assumptions; that goods prices are constant in currency of producer and that, there is an important link of exchange rate change to buyer of goods. Friedman argued that, choice of exchange rate regime would matter less if market price of goods adjusted quickly to shocks. He maintained that if internal prices were as flexible as exchange rate, there is no need for adjustment since it won't make any economic difference.

Assessing relative-price effect and its importance to choice of exchange-rates regime, Friedman (1953) rightly emphasized the significant of normal goods price adhesiveness. In the same line of argument, Zalduendo (2006) emphasized that, monetary issue is key in the decision to join monetary union and choice of an exchange rate regime. Relative-price behaviour is independent of monetary regime in a world of perfect goods price flexibility. The pioneering work of Ghosh (2011), Narayan, Narayan, and Prasad (2008), Borda and Montauban (2000) and Balassa (1964) assumed that market prices are constant

in producer's currencies so that price for consumers fluctuate one-for-one in short-run with changes in NER. This confirms Friedman's position.

Another theory of exchange rate is purchasing power parity (PPP) theory. The concept of PPP is often used to analyse behaviour and to predict fluctuation in exchange rate. Balassa (1964) identified two types of PPP can be distinguished as absolute PPP and relative PPP. He explained that absolute PPP is PPP that exist between two countries. It explains units of one country's currency (e.g. Nigeria's Naira, ₦) which empower the holder with the same command (purchasing power) over goods as a unit of the other country's currency (e.g. USD).

Furthermore, he explained the second as PPP that existed between a country and a group of her trade partners, in this case it is a multilateral comparison. He emphasized that the absolute PPP theory, the "equilibrium" exchange rate, between two currencies is set by the ratio between the price levels in the two countries. Therefore, if goods cost more in the USA than in Nigeria (with goods prices in both countries expressed in USD, using the prevailing exchange rate), the ₦ is undervalued relative to the USD. Similarly, if USD prices of goods are low in the USA, than in Nigeria then the ₦ is overvalued against the USD. Price indices are insufficient to calculate an absolute PPP, so a cost of a basket of goods and services is employed. For example, let us assume the cost of a Motor Cycle in January 2006 was USD60 in the USA and ₦6480 in Nigeria. These figures imply a PPP exchange rate of whereas the exchange rate prevailing at the time was about USD1 = ₦168.

Furthermore, scholars like Coudert (2013) and Bundesbank (2010) viewed the relative PPP theory as that changes in exchange rate which show differences in relative inflation rates. Relative PPP is concerned with ratio of equilibrium exchange rate in a current period relative to equilibrium exchange rate of selected base period. They maintained that PPP theory is determined by ratio of domestic price index in current period to foreign price index in the same period, where both indices have common base period. Thus, if dollar prices have risen at a slower rate in the USA than ₦ prices have risen in Nigeria, the USD should appreciate against the ₦ compared to the exchange rate in common base period.

More so, Gron and Swenson (1996) studied the theory of incomplete pass-through and submitted that, most of the tool used to analysed incomplete pass-through has been pricing-to-market approach that presupposes short-term stickiness and the market strength of importing companies. Foreign suppliers used these market imperfections to set mark-up of prices over marginal cost. Accordingly, following market-to-pricing approach, international markets for manufacturing goods are sufficiently segmented that retailers or producers can, at least over some horizon, control prices they charge to specific domestic demand conditions prevailing in foreign markets. Thus, firms set different prices for their goods across different markets to compete with firms in those markets.

According to Dornbusch (1976), in his overshooting theory of exchange rate, believed that the degree of pass-through depends on market organization, market integration and

substitution between domestic and foreign goods. Evidences seem to suggest that the dominant component of ER behaviour is NER, in a long-run through the incomplete pass-through (Kim, 2001; Kim & Roubini, 2000). In this study, the underpinning theory is the Dornbusch (1976), in his overshooting theory of exchange rate.

2.5 The Concept and Effect of Exchange Rate Volatility

Volatility occurs to any security that rises or falls in value. The term volatility is often used in the stock market, but foreign currencies can be volatile as well. When exchange rate is flexible, as opposed to fixed, they are likelihood for it to go up and down in value, depending upon the strength of the economies involved. As a result of fluctuation, exchange rate volatility effect any business activity or trade involving two or more countries (Ramcharan, 2005). He emphasized that different factors contribute to ERV. Factors like; domestic and foreign money supply, level of output, interest rates, inflation , the exchange rate regime, central bank independence and the openness of an economy. He also maintained that, magnitude of influence these factors have on ER effect the level of state's foreign reserve and productivity. Although, these effect varies and depends on a particular country's economic condition. Thus, transition process countries like Nigeria are more vulnerable to the influence of these factors (Aliyu, *et. al.* 2013).

Bergvall (2004) believed that exchange rate volatility refers to the appreciation or depreciation in value tendency of foreign currencies, thus affecting the profitability of foreign trade. He argued that, exchange rate volatility is the measurement of the amount of exchange rate changes and the frequency of those changes. Furthermore, he posited that, nominal trade banking or investment dealing at the international level is bound to

experience volatility. Bachmeire (2008) maintained that exchange rate volatility is determined by risk premium and not the over studied predictable excess return. He emphasised that, understanding this fundamental is key since the higher moments of economic variables can define volatility of exchange rate but not just the first moment if forward risk premium is quite not volatile. This could have important implications for exchange rate volatility. He submitted by defining exchange rate volatility as the explanation of the behaviour of premium risk a nation's asset or currency is subjected to in relation to other trading nation's assets or currency specifically, her trading partners.

In they own contribution, Serenis and Tsounis (2012) opined that exchange rate volatility among other exogenous variables is a function of the previous year exchange rate volatility. In corroborating with their position, Arize, Osang, and Slottje (2000) observed that Nigeria ERV is always an appendix of the previous year ERV. They emphasized that peoples' perception control and regulate the trend of ERV and it is functionally based on previous years' experience. Additionally, earlier report by McKenzie (1999) submitted a statistically positive and significant influence of last year ERV and the present year ERV. Furthermore, Aliyu (2010) observed that exchange volatility in Nigeria is mostly due to application of ineffective monetary policies. To maintain stable exchange rate, the country need to focus on the influence of structural shocks more than over reliance on monetary policies.

Olumola and Adejumo (2006) submitted that current exchange rate volatility is determined by the marginal ratio of domestic to foreign utility, output levels and

relativity of money supplies. Accordingly, they opined that, current information on preference, technology and real shocks are sources of marginal that encouraged ERV and this occurrence have serious influence on a country's production capacity, international reserve and terms of trade. They submitted that monitored monetary policies should be enforced to discourage conditional exchange rate volatility by the current exchange rate volatility. In addition, Grossmann, Love, and Alexei (2014) and Almukhtar (2013) maintained ERV in turn generate more ERV in the future. They are of the view that, massive clustered volatility always generate a shock that only last for a short-term and that volatility does not really count in the long-run.

In literature, many methodological attempts have been forwarded to explain the behaviour of exchange rate volatility. Although, there is no agreement on precise pattern of behaviour determination. Reinhart and Rogoff (2004) used the GARCH model to explain volatility of exchange rate and opined that, rises in domestic monetary variability leads to falls in premium exchange risk level and forward exchange rate risk premium. This gives credible values of scaling factor to affect exchange rate gratefulness and reasonable volatile exchange rate. The rise of exchange rate and fall in risk premium are opposite to standard perception for effect of increased monetary changes with careless anticipation that financial markets attach positive risk premium to currency of countries with high monetary volatility. This model, differs from previous ones with the view that, sticky price variant, positive monetary shocks lead to increases in global consumption. This implies that, domestic money can be a hedge, in real terms, against shocks to

consumption. Furthermore, higher monetary variability raises expectation of future real value of money which in convexity term leads to exchange rate volatility.

Furthermore, Issa, Lafrance, and Murray (2008) in their attempt to further explain volatility of exchange rate using variant of New Open Economic Model (NOEM) emphasized on a conjecture of Barro and Sala-i-Martin (2003) which tries to explain that, exchange rate volatility is high because of fluctuations in the exchange rate matter less within the economy. They used variant of the NOEM where there is a combination of local-currency pricing, heterogeneity in international price setting and distribution of goods and existence of noise traders (that is, traders who do not base their trades on fundamentals) who impart expectation biases into international financial markets. They submitted that volatility of exchange rate is an exogenous occurrence that small open economy had to face. Cook and Devereux (2014) in their own contribution believed that, NOEM model setup, the conditional volatility of the exchange rate depends on the volatility of the fundamentals such as volatility in relative money supply terms and degree of local-currency pricing. With complete local-currency pricing, conditional volatility of exchange rate effectively rises without bound. This is because the combination of local-currency pricing, along with asymmetric distribution of goods and noise trading, implies a degree of exchange rate volatility that is in excess of the underlying fundamental shocks.

Ricci, Milesi-Ferretti, and Lee (2008) introduced the Fundamental Equilibrium Exchange Rate (FEER) which has been considered as one of the most broadly used concepts in

determining equilibrium ER. They define FEER as the ER that simultaneously achieves internal and external balances. Internal balance is reached when the economy is at full employment output and operating in a low inflation environment. External balance is viewed as a sustainable balance of payments position over the medium term ensuring desired net flows of resources and external debt sustainability. The FEER tends to abstract from the short-run cyclical and speculative forces in the foreign exchange market to explain the behaviour of exchange rate volatility.

2.6 The Concept and Determinants of External Shock

2.6.1 The Concept of External Shock

To researchers and scholars alike, there has not been a conventional or a generally accepted definition of external shock. Scholars like Aizenman, Edward, and Riera-crichton (2012), Ahmed (2003) and John and Mauro (2002) submitted that external shocks basically are any distortion that is not projected or planned for in a country's development plan or annual budget, and it negatively affects the fluidity in its implementation. These scholars posited that a distortion in macroeconomic variables outside projection leads to an imbalance in the demand and supply of what country's imports and exports respectively. On the other hand, scholars like Robert, Buckle, Kim, Kirkham, Lellan, and Jarad (2007) and Agnor, Dermott, and Prassad (1999) viewed external shocks as any unplanned distortion that impaired the actualization of a desired target by a country for a particular point in time. To them, external shock can be both positive and negative distortion. They emphasized that since the plan or the budgets does not cover these occurrence, they become problems to the economy.

Devereux and Yu (2014) viewed external shock as an unexpected change in macroeconomic variables which takes place outside the economy. An example might be increase in the price of oil having impact on firm's costs of production, increase in political stability which might reduce the cost of production or global financial instability which might increase the cost of production. In economics, shocks are unexpected or unpredictable events that affect economic performance either positively or negatively. Aliyu, Yakub, Sanni, and Duke (2013) submitted that, external shock refers to unpredictable change in exogenous factors. These are factors that are practically unexplained by planned economic policies but have impact on endogenous macroeconomic variables. They emphasized that response of macroeconomic variables, like output, inflation, employment and terms of trade, at the time of the shock and at subsequent times, is measured by an impulse response function.

Sil (2007) noted that shock due to supply constrained shock usually result in price increase for a particular product. A supply shock is accompanied by suddenly changes in price of commodities or services. It might be due to sudden increase or decrease in the supply of particular good which affect equilibrium price. A negative supply shock raise prices and shift the aggregate supply curve to the left. A negative supply shock can cause stagflation due to a combination of rising prices and falling output. A positive supply shock lower price of good and shift the aggregate supply curve to the right. A positive supply shock could be due to advance in technology (a technology shock) which makes production more efficient, thus increasing output. Inflationary shock happens when prices of commodities increase abruptly (e.g. following government subsidies cut) while salaries

are not adjusted immediately throughout the society. This leads to a temporary loss of purchasing power for many consumers or production costs fall behind corporate revenues (e.g. following energy price hikes).

Hirata, Kim, Sunghyun, and Kose (2007) viewed external shocks from both macroeconomic and microeconomic perspectives. They defined external shock as accidental occurrence devoid of plan and capable of causing confusion. They maintained that macroeconomic shocks are financial crisis, political instability, oil price fluctuation and disaster such as flood, earthquake and tsunami. They believed that, shocks at household level such as health, income, and consumption shocks.

Farzennegan and Markwardt (2009), on the other hand, believed that external shock can be demand oriented. They asserted that, positive demand shock increases demand and negative demand shock decreases demand. Prices of goods and services are affected in both cases. When demand for a good or service increases, its price typically increases because of a shift in the demand curve to the right. When demand decreases, its price typically decreases because of a shift in the demand curve to the left. They submitted that demand shocks can originate from changes in things such as tax rates, money supply, and government spending.

2.6.2 Determinants of External Shock

The impact of external shock in the regulation of the economy has been a source of concern for both developed and developing economies. The quest to understand the determinants of external shock has been as disturbing as its impact on the economy.

Farzennegan and Markwardt (2009) and Hamilton (2009) in their separates studies focused on the sharp declines in growth over shorter timeframe events that, in their views, are related to, but distinct from, permanent changes in output and possibly of greater concern to policy makers. Also, IMF (2010) noted that external shock are like accidental discharge and nations should be proactive in their ways to coping with them since the determinants can at time occurred once in a decade or century.

In the quest to be proactive and cope with presence of external shocks, research and policy makers' device or approach to understanding external shocks and develop methods of managing them. One of such attempts was to model and test for deviation from PPP for passionate understanding of shocks in an economy. Highlighting on weakness of PPP explanation of exchange rate but posit that exchange rate movements can be caused by the real side of the economy not just purchasing power of wealth holder in the countries involved. Exchange rate explains the productivity level and degree of country's trade openness (Soto, 2003). Though model may varies, depending on the factor that is considered to affect the behaviour of the exchange rate. Model based on productivity differentials was developed by Balasa (1964) and Landry (2005) while Velasco (1999) model exchange rate based on demand shocks respectively. Exogenous changes in terms of trade have also been discovered as key in determining exchange rate behaviour (Mccauley, 2003).

Juthathip (2009) based on results from developing economies in Asia submitted that exchange rate is determined by some fundamental variables. To him, the key fundamental

variables include net foreign assets, trade openness, productivity differentials, government spending, and term of trade. Other variable such as output gap may be included in some countries where such factors play important role in determining exchange rate. Moreover, it has been argued that exchange rate in developing or rapidly transforming countries are likely to be particularly dependent on these real shocks. This implies that, the extent to which different shocks affect the behaviour of the exchange rate is country specific factors. In this respect, there is a consensus on the fact that exchange rate behaviour at medium to long term horizons can partly be explained by its own fundamentals.

Klein and Shambaugh (2008) after an empirically examining the effect of domestic absorption and consumption in response to exogenous shocks in about 35 low-income countries, submitted that financial crisis, political instability, oil price fluctuation, remittance war/terrorism and natural drought determined external shock in the observed countries. Broda (2004), Ahmed (2003), Ravin, Schmitt, and Uribe (2007) and Raddatz (2007) also in a different study subscribed to the position that external shock is always a function of the aforementioned factors. Though, they maintained that the degree of shock that can be generated by these variable differs but collectively or individually are responsible for external shock in an economy.

Chia and Alba (2006) in their own submission disagreed with Adei (2004) that even economies that are not completely open to the world are confronted with external shock palaver. They considered the case of Cuba and North Korea. They postulated that natural

disaster and poor internal political system along with the former observation of chronic financial fluctuation are responsible for external shock. However, Adei (2004) after analysing the Nigeria's economy, believed that, external shock accounts for the level of a country's exposition to global economy. He believed that globalization is one of major determinants of external shock. He emphasized that global financial crisis, war/terrorism, remittance and glut in global consumer product such as oil product fluctuation determine external shock.

2.7 The Relationship between Exchange Rate Volatility and External Shock

Theories and models have been postulated with the view of explaining or establishing the relationship between exchange rate volatility and external shocks. Classical contributions were made with no definite line of definition as to what exactly is the direction of the relationship. Mundell-Fleming in their sticky-price model considered the behaviour of exchange rate under fixed and flexible exchange rate condition and submitted that volatility of exchange rate can be explained by international shock or external shock transmission on the domestic economy exchange rate. They maintained that economy is constantly affected by different types of external shocks which distort the level of none exogenous variables. The stability of the exchange rate would be distorted thereby exposing it to volatility behaviour.

Dornbusch (1976) in his overshooting model or dynamic model of Mundell-Fleming model explained that exchange rate in a free float behave like stock price. He believed that exchange rate exhibit more volatility than other macroeconomic fundamentals such as the money supply and the real GDP. Dornbusch presents a dynamic model of Mundell-

Fleming's model that explained excess exchange volatility in a deterministic foresight setting. In his analysis, he explained the slow adjustment in the good market combined with the instantaneous adjustment in the assets market to explain why exchange rate, which are the relative prices of two monies (assets), may exhibit volatility than the fundamentals in a deterministic and perfect-foresight environment. With this model, Dornbusch was able to trace the relationship between exchange rate volatility and external shock within an economy. In his analysis, he explained that a change in monetary policy due to unanticipated permanent increase in the money supply in the market will adjust to a new equilibrium between prices and outputs.

In the short run, stickiness of prices of goods causes equilibrium level through shifts in financial market prices. A new equilibrium is attained in the long term as price of goods unstick as the foreign exchange market continuously change prices. He maintained that only after this process has been observed that a new long-run equilibrium be attained in domestic goods market, currency exchange market and money market. He concluded that exchange rate will initially overshoot monetary change achieving a new short-run equilibrium. However, goods price will eventually respond, allowing exchange rate (foreign exchange market) to dissipate its overshooting, and the economy to attain new long run equilibrium in all markets.

Empirical evidence found that external shocks have a significant impact on behaviour of exchange rate volatility of many countries either developed or underdeveloped. External shocks via its impact on some macroeconomic variables that are strong determinants of

exchange rate alternate the behaviour of exchange rate, thereby making it to be volatile. Hall, Hondroyiannis, Swamy, Tavlas and Ulan (2010) analysed the overshooting effect of the exchange rate of some economies in Asia during and after the Asian financial meltdown of 2007-2008, concluded that the financial meltdown has a very high correlation with exchange rate volatility of those countries. Collier and Goderis (2009) submitted that the EU countries exchange rate were highly influenced by the downturn of the Wall-Street crisis that snowballed into the global financial crisis in the 2007-2008, respectively.

Some studies on the relationship between political disorder and exchange rate volatility suggest a dual effect of political instability on the exchange rate volatility. Some scholar submitted direct relationship between exchange rate and political disorder (Klein & Shambaugh, 2008). These scholars are of the opinion that exchange rate of countries becomes volatile if political instability leads to low level of productivity and decline in general capital supply. Other submitted that political instability leads to distortion of some macroeconomic variables such as money supply, saving or investment and domestic commodity sales thereby putting exchange rate under pressure of volatility (Broda, 2004; Hirata, Kim, Sunghyun, & Kose, 2007). However, Olumola and Adejumo (2006) believed that through brain drain political instability reduce productivity and thereby encourage exchange rate volatility. They argued that since labour is mobile, best brains would migrate to stable political environment to contribute to their home GDP. Kim (2001) opined that political stability has a strong correlation with a nation's exchange rate volatile behaviour.

However, investigation and report in Nigeria has strongly aligned with the direct relationship between exchange volatility and political instability. Sims (1992) considering the relationship between exchange rate volatility and external shock in selected countries in the Middle East submitted a dual result. He opined that political instability as form of external shock strongly affects exchange rate level of some countries while in others political instability does not affect their exchange rate level. Amedu (2010) asserted that the high level of political instability encourage volatile exchange rate. He explained this using the election year and nonelection year. He noted that election year is full of political uncertainty, thereby creating a tense atmosphere for exchange rate volatility.

Additionally, relationship between exchange rate volatility and external shock is more pronounced in the behaviour of oil price fluctuation. One of the determinants of external shock (oil price) has been captured in existing literature as having a strong relationship with exchange rate volatility. For most economies of the world that depend on exportation of oil to finance their economy, any fluctuation experienced by the price of oil at the international oil market affect the exchange rate level.

Plausible reasons for the relationship between oil price and exchange rate level has attract attention of economists since the last four decades. This interest was as result of observed linkage between oil price realizations and episodes of recession. Bulk of pioneer studies on oil price exchange rate nexus were targeted at establishing causal links. This was due to the fact that oil price episode was viewed as period for increase revenue while recession as an adverse period for oil dependent economies (Amino & Van Norden,

1995; Bundesbank, 2010; Geiregat, 2004; Kim, 2001; Zhang, 2008). Success of these efforts with respect to establishing causation effect was minimal, although their empirical evidences demonstrated that unanticipated rises in the price of oil have a strong impact on exchange rate. Subsequent oil price episodes have resulted in evolution of the perception of exchange rate volatility. Scholars like Mehrara and Oskoui (2007), Coudert (2013), Caruth, Hooker and Oswald (1996), Bernanke, Ben, and Blinder (1992) and Mork (1994) looked at the episodes of decline in the price of oil as was the case of mid-1980s and 2008, and reported the existence of an asymmetric relationship between oil price fluctuation and exchange rate volatility.

Furthermore, Bleaney and Francisco (2007) submitted a significant relationship between oil price and exchange rate volatility. In their submission, they maintained that natural disaster, major countries export price, global capital inflows rate, nations political stability rates, war/terrorism and remittance have a significant relationship with a country's specific exchange rate level. Raddatz (2007) corroborated the above position from the study of the Enron and the Wall-street saga and the strength of the American dollar. He maintained that external shock is highly related to exchange rate volatility.

2.7.1 Exchange Rate Volatility and Political Instability

Whilst researchers have long documented possibility of relationship between political instability and exchange rate volatility, the empirical understanding of this relationship remains still very divergent in nature. Some authorities believe that political instability leads to exchange rate volatility, others believed it has no known significant effect. Alesina and Wagner (2005) reported a direct relationship between political instability and

exchange rate volatility. In their analysis, they discovered that high level of political instability leads to high level of exchange rate volatility. Blomberg, Frieden and Stein (2005) conducted a research in which they observed a non-direct relationship between political instability and exchange rate volatility. They submitted that through some determinants of exchange rate such as money supply and interest rates, oil price shock, and political instability lead to highly volatile exchange rate. In his own contribution, Kuznet (1966) noted that high levels of exchange rate volatility should be expected under conditions of political instability, especially at the unset of regime changes. From his analysis on effect of political disorder on the behaviour of exchange rate, he submitted that political stability encourages stable exchange rate.

In addition, Bonomo and Terra (2006) studied the relationship between exchange rate volatility and political instability in eight Latin American countries. They argued that the relationship works both ways. The link between exchange rate volatility and political instability is via the costs of doing business as explained by the responsibility hypothesis. The responsibility hypothesis posit that, in highly unstable political environment, if the political structure can responsibly control the cost of doing business, the political instability will not lead to exchange rate volatility. If otherwise, it will lead to exchange rate volatility.

In continuation of the debate, Calvo and Reinhart (2002) studied the exchange rate volatility and the political instability in some selected Latin American countries. They submitted a highly correlated relationship between exchange rate volatility and political

instability. They reported that the politically unstable states are prone to a more volatile exchange rate situation than politically stable states. Adding his own voice, Drazen (2005) from the study of three Asian states and 12 African countries reported that political instability favours countries with poor economic growth, unstable FDI inflow and spurious exchange rate conditions. He opined that political instability determines the behaviour of exchange rate. Also, Dixit and Jensen (2003) using a simulation approach find that exchange rate volatility is responsible for political instability not the other way round as opined by some earlier researchers like Collins (1996).

Furthermore, Gardeazabal and Alberto (2003) studied some selected countries from Mid-East and North Africa and submitted that political instability strongly influence exchange rate behaviour. Countries that experienced political challenges have high correlation with exchange rate instability. In the same vein, Alesina, Ozler, Roubini, and Swagel (1996) used panel data of 113 countries to investigate relationship between political disorder and exchange rate volatility. They reported robust positive relationship between political instability and exchange rate fluctuation.

Melvin and Taylor (2009) and Gardeazabal and Alberto (2003) stated that political uncertainty causes exchange rate volatility. The researchers used GDP per capita (exchange rate volatility) as the dependent variable and government changes (political instability). Noy and Nualsri (2008) used co-integration model to estimate political uncertainty and exchange in some selected LDCs, reported that long-run relationship exist between exchange rate and political instability. They emphasized that political

instability leads to macroeconomic imbalance which affects the exchange rate in the studied countries. In a similar view, Von Hagen and Zhou (2002), Dibooglu and Ali (2001) separately submitted that strong evidence of long-run positive relationship exist between exchange rate and some external shock factors like oil price and political stability.

More so, Hoffminister and Roldos (2001) used political instability as dummy variable in estimation of behaviour of exchange rate and political instability in 97 countries for the period of 1963 to 1988 (26 years). They submitted that, there is a statistically positive and a significant relationship between political instability and exchange rate volatility with the exception of some few countries. Furthermore, Erkens, Hung and Matos (2012), Allard, Martinez, and Williams (2012) and Ahmed and Alih (1999) used exchange rate as the dependent variable, reported positive relationship between exchange rate and political instability. Dercon (2004) used similar methodology but included changes in political instability in two different time periods. He concluded that political instability influenced exchange rate behaviour Though, Gardeazabal and Alberto (2003) found a significant relationship between political instability and exchange fluctuation only on sampled countries from African continent.

However, Melvin and Taylor (2009) found no statistically significant and positive relationship between political instability and exchange rate volatility in their investigation. Also, Calvo and Reinhart (2002) after conducting his research on the direction of causality of exchange rate volatility and political instability on some selected

countries in Latin America and SSA, submitted that bidirectional relationship exists between the variables. They opined that political instability causes exchange rate volatility and exchange rate volatility also causes political instability.

In addition, Bleaney and Greenaway (2001) studied the relationship between political instability and exchange rate volatility in LDCs. The scholars used simultaneous equation model to investigate the relationship, through investment channel, submitted that there is a bi-directional causal relationship between political instability and exchange rate volatility. Agu (2002) used a single equation structural time series for his analysis and reported that exchange rate distortion might have arisen from a more fundamental factor not just oil price shock as have been posited by many researchers maybe political stability can be of help.

Contributing to this debate, Easterly, Islam and Stiglitz (2000) investigated the causality between political instability and exchange rate volatility by using Granger causality tests. Using 19 countries in their study and GDP per capita and as index of political stability, they reported a direct and an empirically significant relationship between political instability and exchange rate volatility in 14 out of the 19 countries that they examined. It was only in two countries they reported that political instability actually increased exchange rate stability whilst for the other countries; the causality ran in the opposite direction. But, Geiregat (2004) investigated the essential sources of exchange rate instability in 18 Latin American countries from 1971 to 2000. He investigated whether unstable regime, regime durability, factionalism, income inequality, ethnic diversity,

ethnic discrimination and regional overflow affect exchange rate. The summary of his findings was that unstable regime caused exchange rate volatility in eleven countries while it has no effect in five countries, it led to stable exchange rate in two countries.

The inconclusive results presented by various authors in this review might be as a result of the use of different locations, different dependent and independent variables, time and the sample size. In all, a result or a finding stating a relationship between political instability and exchange rate volatility has been established.

2.7.2 Exchange Rate Volatility and Financial Crisis

At the end of the Bretton Wood's system in the 1970s, most countries embraced financial market liberalization in the 1980s and 1990s. This development has experienced several crises in certain countries and regions in the form of large output losses. There has been the case of whether countries operate fixed or flexible exchange rate. In literature, models have been generated with the view of explaining the relationship between the exchange rate volatility and large assets loss (financial crisis). Although there is no general view on how the relationship operates, there was an understanding on the existence of a relationship. Scholars like Erkens *et al.* (2012), Lama and Medina (2010) and Kroszner, Laeven, and Klingebiel (2007) in their views believed that uncertainty in the movement of macroeconomic fundamentals causes exchange rate volatility. In their model, they observed that macroeconomic fundamentals like interest rates, money supply terms of trades and inflation are responsible for exchange rate volatility.

In another approach, scholars like Dornbusch (1976) and Falvey, Foster, and Greenaway (2012) believed that it is the forces of expectation that leads to large output loses and subsequent volatile exchange rate. In Dornbusch's model, the rational expectation model, he maintained that expectation leads to a jump or overshooting which destabilized the fundamentals of the economy. This situation leads to exchange volatility as a result of massive output loses. Although, Falvey, Foster, and Greenaway (2012) still submitted that since empirical evidence to explain the jump or overshooting and rationality cannot be explicitly presented, an approach that relates market imperfection in understanding the relationship between financial crisis and exchange rate fluctuation should be encouraged. Although these scholars agreed that turbulent financial situation galvanized exchange rate volatility.

More so, Mccauley (2003) submitted that volatile exchange rate leads to a transverse feedback mechanism which in turns generates a real crisis in the real sector leading to large loss in financial assets. Also, Hayakawa and Kimurafi (2014) studied the Asian and Russian financial crisis of 1997-98, opined that a fall in currency strength triggers margin calls and consequently "fire-sale" of collateral assets. This occurrence collapses the economy to a low level equilibrium thus large output and financial losses. In addition, Sani, Hassan, and Azam (2016) reported that financial crisis deepened exchange rate volatility in Nigeria. In their report, they believed that as financial crisis increases, exchange rate become dampen and vulnerable. These authors believed that increase in the level of financial uncertainty exacerbate macroeconomic variables instability which

invariably decreases internal productivity. A situation that puts exchange rate constantly under pressure.

In addition, Noy and Nualsri (2008), Ramcharan (2005) studied financial crisis and exchange rate fluctuation, concluded that the integration of countries' economies via the use of basket exchange rate type exposes them to danger of international financial crisis. This analysis confirms the increase of the relative volatility of one member country's exchange rate on the other and consequently the financial integration and the follow up crisis. In the same vein, Bjorken and Brook (2002) examined the effect of financial crisis and the exchange rate volatility via analysis of inflation over the period 1971-94 for 93 countries. He found that a high level of financial uncertainty is associated with the level of exchange rate volatility. This result also suggests that a higher level of financial stability favours a fall in exchange rate volatilities.

In particular, Hau (2002) in his own contribution submitted that from a number of countries over both short and long-run horizon, there is much variance between exchange rate volatility and financial instability. He maintained that in both the short and long run, exchange rate fluctuation can be explained by financial stability. Hausler (2002) studied the effect of financial control on the exchange rate movements. He showed how financial controls can reduce the effect of speculators' behaviour on exchange rate. Frequent financial crisis in the emergent markets, caused by an increased volatile flow of finances, highlights the volatility in exchange rate. Malik, Ullah, Azam, and Khan (2009) reported that the control of financial crisis in the context of managing FDI, money supply and

trans-border capital flow would account for stable exchange rate. He emphasized that when these variables which are strong determinants of exchange rate are put under control, financial crisis would subsequently be reduced. This means that financial stability strongly explains exchange rate volatility. In the same vein, Dominguez, Hashimoto, and Ito (2012) and Kohler (2010) noted that a significant increase in speculation and unstable financial system is generally accompanied by a strong exchange rate volatility.

In their own contribution, CamaERo and Tamarit (2002) submitted that when there is a financial market boom, it will lead to real exchange rate appreciation irrespective of whether the exchange rate is fixed or flexible and when there is a crisis in the financial market exchange rate would be faced with a crisis. In his analysis, he linked the relationship between financial crisis and exchange rate volatility through the effect of oil price shock. Brander and Krugman (1983) showed that globalization and liberalized capital lead to exchange rate fluctuations. They posited that globalization gives room for free flow of capital and possibly financial shock, and this constantly puts countries exchange rate under pressure. They further explained based on their findings that the global financial crises lead to exchange rate volatility in many countries.

Also, Calderon and Serven (2004) evaluated the determinants of real exchange rate volatility for 21 industrialized countries. Their results shows that financial stability is one of the major determinant of exchange rate stability Issa, Lafrance and Murray (2008) studied the case of Canada and showed that the financial stability decreases exchange rate

volatility. Meese (2007) studied the effect of interest rates on financial instability and its subsequent transmission on exchange rate volatility using the monetary model. He reported that interest rates distort the price which encouraged inflation and subsequently leads to financial shock. The shocks transcends to the fluctuation of exchange rate.

However, Botha and Pretorius (2009) believed that the effect of financial instability on economic fragility can be reduced by more stable exchange rate. Indeed, the rise in the exchange rate volatility can be compensated in the financial markets by a strong capital mobility that helps to absorb external shocks. However, it cannot be a guarantee against the prolonged misalignments in exchange rate resulting from bad resource allocation and macro-economic instability. Dornbusch (976) suggested that exchange rate volatility in a globalized economy can make a country vulnerable to the external shocks. In sufficiently general model, Obstfeld (1997) observed that exchange rate fluctuations can generally be accounted for by financial crisis, other variables remaining constant. Extreme cases of financial crisis can force the exchange rate to collapse.

On the contrary, other empirical works submitted inconclusive results concerning the effect of the financial fluctuation and exchange rate volatility. Aliyu (2008) did not find a logical empirical relationship between financial crisis and real exchange rate fluctuation. Similarly, Easterly, Islam, Kim and Nourel (2000) in an earlier worked on sample of some industrialized countries over the period 1960-97 concluded that financial fluctuation has no significant impact on the volatility of exchange rate. However, they believed that the higher the level of financial fluctuation control, the lesser the volatility

of the exchange rate. Chen and Rogoff (2002) investigated the sources of financial crisis and exchange volatility in some selected developing countries over the period 1970-1992 reported that there is no significantly relationship between financial crisis and exchange rate volatility. Velasco (1999) studied the influence of financial instability on real exchange rate volatility using the impact of interest rates, trade openness and industrial productivity index as independent variables, found that there was no correlation between interest movement and real exchange rate

2.7.3 Exchange Rate Volatility and Oil Price

The potential role of oil price variations in deriving terms of economic activities and impacting on exchange rate has already received numerous literature attentions. Several studies have been carried out without totally eliminating the imprecision of the effect of oil price variation on exchange rate for both oil importing and exporting countries alike. Some claim the existence of a relationship between oil prices and exchange rate in both oil importing and oil exporting countries. From a theoretical perspective, Mccauley (2003) and Golub (1983) developed models in which shifts in oil prices generate wealth transfer effects and portfolio reallocations, leading to adjustments in exchange rate to clear asset markets. As regards the bilateral exchange rate between two or more oil importing countries, the relative propensity to import oil and their respective bilateral trade deficits against oil producing countries are the key variables in explaining whether a rise in the oil price will lead to an appreciation or depreciation of currencies.

Jon and Eric (1994) using the Blanchard decomposition observed that much of the variance from both real and nominal exchange rate from numbers of countries over both

short and long horizons is due to real shocks. The conclusions from the structural time-series literature therefore seem to be robust for both decomposition methods and currencies. This observation has led some scholars like Amalia and Simon (2012) to suggest that an unidentified real factor may be causing persistent shifts in real equilibrium exchange rate also using the Blanchard identification strategy.

Furthermore, different sources of real shocks have been investigated in Von Hagen and Zhou (2002). From their analysis, they reported that among the many sources of real shocks such as oil prices shocks, fiscal policy shocks, and productivity shocks, oil price fluctuations play a major role in explaining exchange rate movements. Also, Clarida and Gali (1994) estimated the share of exchange rate variability that is due to different shocks by using quarterly USA–Canada, USA–Germany, USA–Japan, and USA–UK real exchange rate data from 1974:Q3 to 1992:Q4. They found that real shocks can account for more than 50 percentage of variance of exchange rate changes over all time horizons.

Moreover, Chaudhuri and Daniel (1998) investigated 16 OECD countries and found that the non-stationary behaviour of USD exchange rate was due to the non-stationary behaviour of real oil prices. Previously, similar results was obtained by Amino and Van Norden (1995) using data on real effective exchange rate for Germany, Japan, and the USA, they found that the real oil price was the most important factor determining real exchange rate in the long run.

Zalduendo (2006) used Vector Error Correction Model (VECM) in his analysis and found that increases in oil prices is equally accompanied with a decrease in exchange volatility. From the impulse and response analysis, he reported that oil price shocks were responsible for over 75 percent of the volatility in exchange rate. Also, Olumola and Adejumo (2008) used quarterly data over the period 1970–2003 to examine the relationship between real oil price shock and real effective exchange rate, among other macro variables in Nigeria. Applying the variance decomposition technique, based on a Vector Autoregressive (VAR) model, they found that real oil prices lead to an appreciation of the exchange rate. Furthermore, CamaERo and Tamarit (2002) using a panel co-integration techniques to investigate the relationship between real oil prices and the Spanish peseta's exchange rate, submitted that an increase in oil price, stabilized exchange rate. Coudert (2013) submitted that the long-run exchange rate of Algeria stability is dependent on movements in relative productivity and real oil prices increase.

Jin (2008), analysed a panel data of G7 countries, showed that real oil prices may have been the dominant source of exchange rate movements. He reported that there is a negative link between oil prices and exchange rate volatility. Benassy-Quere and Dramane (2014) in their study, used co-integration and Granger causality test to explain the relationship between the real price of oil and the real price of the USD over the period of 1974–2004. The authors found that, other things been equal, ten percent rise in the oil price leads to a four percent appreciation of the USD in real effective terms in the long run.

Soludo (2008), used the EGARCH and VECM, investigate the relationship between oil price shock and the ER of Nigeria. He observed a positive and significant relationship between oil price shock and exchange rate stability. In the same line of argument, Odularu (2008) conducted a research to locate the direction of relationship between oil price fluctuation and the exchange rate in Nigeria. In his finding, he concluded that there is an existence of a negative correlation between oil price and exchange rate volatility in Nigeria. In terms of the direction of the relationship, he posited that it is the oil price that determines the behaviour of exchange rate. In his own contribution, Amedu (2010) used a quarterly data from 1977 to 2006 to investigate the relationship between exchange rate and oil price shock. He submitted that exchange rate volatility in Nigeria can be explained by the international oil price fluctuation.

Furthermore, Seyhun, Murat, and Salim (2012) in their analysis using a calibrated macro model to explain the behaviour of oil price fluctuation and exchange rate movement of Turkey, submitted that oil price plays an important role in the explanation of Turkey's exchange rate movement. Alley, Asekomeh, Mobolaji, and Adeniran (2014), used a Generalized Method of Moments (GMM) to estimate the relationship between oil price fluctuation and exchange rate, reported that oil price cause exchange rate fluctuation. Olumola and Adejumo (2006) using the Engel and Granger co-integration model of two step equations to analyse impact of oil price on exchange rate fluctuation in Nigeria. The authors posited that a strong negative relationship exists between the price of oil and the real effective exchange rate for Nigeria.

Aliyu (2010) pointed out that there is a weak empirical support for positive impact of oil price and exchange rate volatility using a simulation method for his analysis. Thus, it can be inferred that exchange rate volatility in Nigerian may not be entirely due to oil activities, but to factors relating to external shock variables and poor management policies in the country. Adedipe (2004) and Aliyu *et al.*, (2013) in their separates researches investigated external shock and exchange rate fluctuation in Nigeria. International oil price was used as a proxy for external shock, they submitted that a negative but not significant result between external shock and exchange rate volatility. They concluded that other shock variables such as political instability, natural disaster which are stronger than oil price and are more responsible for the nation's exchange rate volatility.

2.8 Relationship between Exchange Rate Volatility and Capital Inflows

Economies globally have witnessed massive increase in capital flows since 2005. While the 2007 to 2008 global financial crisis triggered strong portfolio capital flows in particular into bonds of some advanced economies, the 2009 to 2011 was the period of recovery in developing economies and the sovereign debt woes in some advanced economies have been marked by a surge in capital flows to developing economies. Yet researchers striking concerned are about these two episodes is not only their global reach, but also the high degree of heterogeneity in capital flows, both across advanced economies and across developing economies (Magud &Vesperoni, 2015).

Theoretically, lot of theories have been postulated to investigate the relationship between exchange rate volatility and capital inflows. In this study, the underpinning theory that is

used to examine the relationship between capital inflows and exchange rate volatility is the push and pull theory. The inflows of foreign capital have been examined with the push and pull determinants as postulated by the push and pull factors theory. In the theory, the classification of capital inflows determinants into two categories of external (push) and internal (pull) factors explained capital inflow into any country (Fernandez-Arias, 1996). On the pull factor side, the determinants of capital inflows are foreign reserve, trade openness, exchange rate volatility and GDP.

Examination of how exchange rate volatility respond to capital inflows is important to understand the role of foreign fund in host counties. Several studies have examined empirically the effects of ebbs and surges in capital inflows on exchange rate volatility of the host countries. The findings of the studies are inconclusive at best, however. On the one hand, large number of studies have submitted that increase in capital inflows help promote investment, stimulate economic growth, discouraged exchange rate volatility and enhanced trade openness. Proponents of this position include, among others scholars like, Reisen and Soto (2002) who opined that surge in capital inflows stabilized exchange rate volatility and its ebb appreciate exchange rate volatility. Similarly, Wang and Wong (2009) posited that capital inflow when encourage and well managed depreciate exchange rate volatility.

Also, scholars like Alfaro, Chanda, Kalemli-Ozcan, and Sayek (2004), Buch, Kleinert, Lipponer, and Toubal (2005), Choong, Lam, and Yusop (2010), De Mello (1997), Hermes and Lensink (2003), Kose, Prasad, Rogoff, and Wei (2009) and Obstfeld (2009)

in their separate submissions opined that a surge in capital inflows depreciate exchange rate volatility. In their own contribution, Kyongwook, Kyuil, and Seungwon (2013) and Basant (2005) studied the behaviour of exchange rate volatility and capital inflow in Korea and Singapore respectively submitted that capital inflows in the form of FDI, remittance and long term bond reduces exchange rate volatility.

However, on the other hand, scholars like Caballero (2012) believed that exchange rate volatility of the host country experience more volatility with an increase in the capital inflows. In their own contribution to the debate, Cecen and Xiao (2012) after their analysis of Turkey capital inflow and exchange rate volatility reported a negative relationship between exchange rate volatility and capital inflows. Also, Nicolas and Esteban (2015) opined that capital inflows is pugatory not paradise for the host country. Additionally, scholars like Calvo, Leideman, and Reinhart (1993), Furceri, Guichard, and Rusticelli (2011), Gosh, Ostry, and Qureshi (2014), Sabastian and Roberto (2009), Sethi and Sucharita (2012) and Vegh (2013) all reported a negative findings of the relationship between exchange rate volatility and capital inflows for the host countries.

In their contribution Edu,, Inaya,, and Bassey (2015) revealed that foreign capital inflow has a positive but insignificant effect of on economic growth (GDP) and domestic investment, while having a negative and non-significant effect on national savings. They further explained that the relationship between economic growth and Naira value is probably explained by other variable not capital inflows. However, Nkoro, and Furo (2012) in an earlier study using the concept of co-integration, variance decomposition,

impulse response analysis and block Exogeneity tests, examined the impact of foreign capital inflows on economic growth in Nigeria. The results of the co-integration revealed that causal relationship exist between foreign capital inflows and economic growth in Nigeria. These scholars maintained that exchange rate volatility plays a vital role in determining the pull and push effect of capital inflows in Nigeria.

Also, from the result submitted by Samuel and Victor (2012) using a four-sector medium scale macro-econometric model namely production and supply, aggregate demand, external sector and money and prices with 49 variables comprising of 18 endogenous variables, 31 exogenous variables and 14 identities. It found very weak link between the real and exchange rate. On their own part Yaqub, Adam, and Jimoh (2013) in a bid to x-ray the relationship between some external sector crises and the GDP of Nigerian economy, using modified Granger causality procedure to derive the relevant models while estimation followed the log-linear least squares procedure against annual Nigerian data from 1970 through 2001. The diagnostic test results indicate that the specified models possess satisfactory forecasting and explanatory powers. They submitted that growth through foreign capital inflows can be forecast by the level of the country exchange rate value.

An attempt to investigate the impact of economic capital inflows on economic growth in sub Saharan Africa with special reference to Nigeria, Ghana and South Africa was made by Ikechi and Anayochukwu (2013), economic capital inflows were found to have impacted positively on the economic growth of the aforementioned economies with the

greatest impact on South Africa, followed by Ghana and Nigeria. In terms of causality relationships, economic capital inflows are seen to granger cause economic growth in South Africa and Ghana, though the impact was felt more in South Africa than in Ghana. The situation was different for Nigeria, where economic growth was seen to granger cause economic capital inflows.

In a related study by Abdullahi, Aliero, and Yusuf (2012), evaluate the macroeconomic effect of economic capital inflows on the Nigerian economy. Using secondary data for forty–one years. Assessing the relative importance of the socio-political and economic determinants of capital inflows in Nigeria using an Error Correction Mechanism, the scholars found that altruism is important for economic capital inflows, as per capita income differentials, gross capital formation, official Nigerian migrant remittances and economic/political freedom are significant and positive, implying that economic capital inflows are countercyclical in nature. However, there is evidence to suggest that the relationship between exchange rate volatility and economic capital inflows is not linear–positive at low level of capital inflows and negative at higher capital inflows.

Eravwoke and Eshanake (2012) examined the sustainability of the FDI-growth relationship in Nigeria using the Johansen cointegration framework and a multivariate VAR within a vector error correction model. He concluded that a long-run equilibrium relationship between exchange rate stimulated economic growth and FDI inflows exists as well as a unidirectional causality runs from FDI to economic growth is found.

Tiwari, Mutascu, and Albulescu (2013) also examined the relationship between economic growth, exchange rate volatility, and FDI for Asian countries using panel data approach. They disclosed that both foreign direct investment and exports enhance the growth process by reducing the impact of exchange rate volatility. Aurangze and Ul Haq (2012) observed the impact of foreign capital inflows on economic growth of Pakistan for the period of 1981-2010. A multiple regression analysis technique was used to identify the significance of different factors. Their results indicated that the three independent variables (remittances, external debt and foreign direct investment) are positive and have a significant relationship with economic growth (GDP). The scholars emphasized that these variable decrease the impact of exchange rate volatility to provide the ground for meaningful economic growth.

Alege and Ogundipe (2013) investigated the relationship between FDI and economic growth in Nigeria for the period (1970-2007). Results obtained therein showed that FDI and economic growth under studied by exchange rate volatility are jointly determined and that there is a positive feedback mechanism between the two i.e. from FDI to growth and from growth back to FDI; but Egwaikhide (2012) obtained a different result from a similar study carried out within the same time frame of 1980 to 2009. Result of their research revealed a long run relationship between FDI and variables of economic growth and a unidirectional causality between FDI and growth in Nigeria.

2.9 Gap of the Study

In the process of reviewing literatures, certain observations were made which necessitate the conduct of this research. Previous literatures reviewed did not treat the order in which

the exogenous variables of external shock will be absorbed in the model. It is was observed that most of the reviewed literatures were concerned with disaggregated analysis of external shocks. Types of external shocks were treated separately instead of collectively. If tested together, findings would provide a more reliable results than in disaggregated form. In Nigeria context, there is paucity of such aggregated study on exchange rate volatility, external shocks and capital inflow. Also, the previous works reviewed that uses oil price as proxy for external shock were more concern with the oil importing countries (demand side of external shock). Despite the fact that Nigeria is one of the major oil exporting nation of the world and considering the influence of oil price on her exchange rate volatility, there is very scanty literature examining the nexus of this relationship. Furthermore, the scanty existing literature findings are inconclusive.

From the reviewed literatures on the relationship between exchange rate volatility and political instability and financial crisis, most of the studies were conducted in Europe, America and Asia countries. The few in Africa are mostly not country specific; thus making the application of their findings very problematic in a country specific situation. Studies on relationship between exchange rate volatility, political instability and financial crisis in Nigeria context are very few and yet inconclusive in their submission. Similarly, studies on exchange rate volatility and capital inflows reviewed are mostly for developed economies and very few studies examine this relationship in Nigeria context. However the existing literature are mostly not country specific and still report an inconclusive findings.

In addition, there is the inability of previous studies reviewed to trace the sources of exchange rate volatility through monetary model, PPP and country specific regression. Also, available works reviewed could not trace the transmission of structural shocks in real exchange rate and the factors affecting it effectively. The relationship between current exchange rate volatility and its conditional volatility in another period ahead was not explicitly emphasized in Nigeria context.

In Nigeria, despite the obvious influence of exchange rate volatility, external shocks and capital inflow operation, there is paucity of empirical work that examined this relationship. Available literatures, both the non-country specific and the country specific are concerned with the disaggregate analysis of this relationship even when the findings application is not yielding any positive result on Nigeria's economy. Nevertheless, there is a paucity of study on exchange rate volatility, external shock and capital inflows, a gap which study will address.

2.10 Conclusion

In this chapter, both theoretical and empirical literature were reviewed on the concept of exchange rate, the various measurement of exchange rate, determinant of exchange rate and exchange rate volatility. The concept of external shock, external shock determinants and types of external shocks literature were also reviewed. In this chapter also, literature on the relationship between exchange rate volatility and external shock was also reviewed with a particular reference to political instability, financial shock and oil price fluctuation. Shortcomings of previous researchers are also explained in this chapter.

CHAPTER THREE
METHODOLOGY

3.1 Introduction

This chapter of the study covered the theoretical framework and methodology used for the analysis. It comprise of seven sections. Section 3.1 is the introduction section and theoretical framework of the study is discussed in Section 3.2. In Section 3.3 and Section 3.4, attention is on model specification and variables justification, respectively. Section 3.5 focused on sources of data and data measurement. Section 3.6 explained the methodological approach of the study. Section 3.7 which is the last section is the conclusion section of the chapter.

3.2 Theoretical Framework

Nigeria like any other developing country put in place policies that encourage economic growth. In a quest to actualized this growth intention, attractive fiscal and monetary policy are always formulated (Bachmeire, 2008; Soto, 2003). The use of monetary policy that ensure sustainably stabled exchange rate can guarantee such enviable economic growth. Accordingly, exchange rate stability varies with the dynamics of previous year level of exchange rate and other variables in the form of external shock, and capital inflows (Castillo, Montoro, & Tuesta, 2010; MacDonald & Taylor, 1991). In addition, unstable exchange rate of the last years if not well managed can influenced the possibility of the current year exchange rate instability (Serenis & Tsounis, 2014). Impact of external shock variables such as oil price, political instability and financial crisis are being observed as shocks that regulate the stability of exchange rate (Sims, 1992). In

addition, the relationship between capital inflows and exchange rate determine its stability level (Lin, Chen, & Rau, 2010).

Theories have been postulated explaining the relationship of exchange rate behaviour and its responses to external shock and capital inflows. For instance, Dornbusch (1976) overshooting theory established the relationship between current exchange rate volatility and its conditional volatility in periods ahead. It also, laid the foundation for the explanation of the relationship between external shock and exchange rate volatility. Similarly, the pull and push factor theory as propounded by John and John (2005) establish a framework for the understanding of capital inflows and exchange rate volatility.

It has been a submitted fact that underdeveloped economies that is embedded in unfavorable condition of exchange rate level, hardly experience stable and sustainable economic growth (Borda & Montauban, 2000). Summarily, underdeveloped nations faced with exchange rate unstableness or volatility always put forward a measures for its manageable stability. When a nation exchange rate is faced with unstableness or volatility of her currency, it dampened productivity (Yuksell, Kuzey, & Ender Sevinc, 2012).

The theoretical literature that served as the underpinning theory in this research for examination of objective one and two is the Dornbush (1976) overshooting theory. The framework of the theory is in line with the fundamental ideal of the simple two-good structure assumption by Dornbush (1976) consists of non-traded and traded goods. The

ER is defined as the local relative price of non-traded to traded goods in an economy as in Equation [1]

[1] $$ER = C_t + P_i - P_n$$

where C_t denote local currency price of foreign currency and P_t and P_n are world prices of and non-traded goods traded goods, respectively. Exchange rate is defined in the way rise implies depreciation. This implies that increase in price of non-traded goods reduces ER thereby appreciating the local currency.

In the description of non-traded and traded goods markets, Montiel (1999) opined that internal balance is the position where markets for non-traded goods got cleared or where demand equals supply as represented by Equation [2]

[2] $$Y_n(e) = c_n + g_n = (1-h)ec + g_n; Y_n < 0$$

where e stands for the real exchange rate, Y_n represents the supply of non-traded goods under full employment, c is the total private spending (measured in traded goods), g_n is the government spending on non-traded goods and h is share of traded goods in total consumption.

Montiel (1999) maintained that current account balance that is compatible with long-run sustainable capital inflows is external balance is as shown in Equation [3]

[3] $$f^{1} = yY(e) - gY - (b + \tau)c + k + xf$$

where f stands for total net foreign assets, f^1 is net foreign assets change overtime, b is real foreign assets, k is the received net foreign aid by the government and b represent trade balance, yield captures in traded goods, yY measured domestic production of traded goods, gY and c is government and private spending on traded goods respectively. τ stand for transaction costs associated with private spending while xf captures external debt service (Montiel, 1999).

In equilibrium, $f^1 = 0$ giving external balance is at satisfaction point along which relationship exist between consumption and ER. This point shows positive relationship between consumption and ER. This is due to the fact that starting from equilibrium, an increase in private spending would create current account deficit at the original ER. To regain equilibrium, the ER must depreciate to drive supply towards traded goods and demand towards non-traded goods.

Therefore, whereas an increase in private spending in internal balance yields an appreciation in the supply of non-traded goods or an appreciation of the ER, a similar shock in external balance yields depreciation, which promotes increase in supply of traded goods. The overall effect of the two markets; that is external equilibrium (EE) or

outside the economy and internal equilibrium (IE) or within the economy produces the equilibrium ER that is homogenous with the fundamentals that determined ER.

Solving for the combinations of ER and private spending on traded goods that are consistent with the notion of external balance by holding *f* at steady state level. And also, setting the right-hand-side of Equation [3] to zero and combining this with Equation [2] to obtain the desired equilibrium exchange rate as Equation [4]

[4] $$e^* = e^*(g_N, g_T, r^* f^* + z, \tau^*)$$

where g_N is government spending on non-tradable goods, g_T is government spending on tradable goods, z stands for net foreign aid received by the government, τ depicts transaction costs associated with government spending on traded goods and rf resent external debt service respectively. The superscripts * represents endogenous variables steady state values. Knowing that cost of transactions per unit are endogenous, and depend on ratio of money holdings to private spending and therefore depend on the nominal interest rates, which is the opportunity cost of holding domestic money.

This implies, that the final assertion for the equilibrium ER in the Montiel's model takes the form of Equation [5]

[5] $$e^* = e^*(g_N, g_T, z, r_w, \pi t) \qquad e_1 < 0, e_2 < 0, e_3 < 0, e_4 < 0 \ldots . e_6 < 0$$

where r_w denotes the world real interest rate and πt is the rate of inflation in the domestic price of traded goods. Thus is theoretical framework served as the framework for the explanation of objectives one and two of the study.

The second theoretical framework of the study is the pull and push factor theory as propounded by John and John (2005). The theory holds that developing economies or emerging markets need capital inflow as one of the key sources of funds to encourage productivity. The scholars are of the believed that with high inflows of capital, productivity will increased. Accordingly, researchers like Peter, Shang-Jin, Azim, and Zeng (2004) believed that increase in productivity enhanced stable and sustainable exchange rate. They maintained that volatile exchange rate condition, however threating the free inflows of capital as investors get frustrated by the flush in the equity power in any economy. They emphasized that products of their investment will be crowded out by foreign products dumping thereby frustrating investment.

The proponents of the push factor theory categorises the determinants of capital inflows into two: that is common factors that push capital inflows toward developing economies and factors that entice capital inflows. The theory was basically model by the scholars with intend of examining behaviour of volatile foreign bond market and domestic stock price. The fundamentals of the theory is adopted to examine the behaviour of capital inflows on some volatile macroeconomics parameters like unstable exchange rate.

As adopted by Hernandez and Valdes (2001) the usual estimated equation for the determination of net capital inflow [CI] can be written as in Equation [6]

[6] $CI = X + Y$

where X and Y are the pull factor and push factors, respectively.

Equation [6] components (X and Y) can be represented as vector of the pull and push factor as depicted in Equation [7] and Equation [8], respectively:

[7] $X = \Gamma X$

where ΓX represent pull (internal) factors

[8] $Y = \Psi Y$

where ΨY represent the push (external) factors. Substituting Equation [7] and Equation [8] into Equation [6] gives Equation [9] which explained the relationship between capital inflows and its determinants

[9] $CI = \Gamma X + \Psi Y$

where ΓX represents the domestic fundamentals and ΨY represents external rudiments that attract capital inflows, respectively. This framework is used in the model specification of objective three of the study.

3.3 Model Specification

In line with the research objectives, literature reviewed and the foregoing theoretical framework, exchange rate volatility model, exchange rate volatility and external shock model, and exchange rate volatility and capital inflows model were developed. The analysis is based on these three main objectives that this research stand to examined.

3.3.1 Current Exchange Rate Volatility Model

Modelling current exchange rate volatility has been a herculean task to economists and researcher of exchange rate behaviour (Mchenzie, 1999). He opined that more worrisome is the generation of the model to capture exchange rate volatility. There are three popular most widely measure of exchange rate volatility; these are the first order difference measures, the standard deviation of the exchange rate growth, and the coefficient of variation of exchange rate growth. In this study, the first order difference measures of exchange volatility is adopted. This approach consider the difference between the current logarithm value rate and previous.

In estimating volatility of exchange rate, Nelson (1991) emphasized that ARCH effect of the series needed to be confirmed before conducting a GARCH model estimation. Estimated result of the series can only valid and reliable if the series has an ARCH effect. It is the AR test result residual that is estimated for the present of ARCH effect.

In this study, like other empirical study, captured exchange rate volatility using the ARCH model by Engel (1982) and the adherence to the augmentation and modification

of GARCH by Bollerslev (1986). The adherence to these models are based on their empirical use in various areas of econometric modelling, especially in financial time series analysis. (Bollerslev, 1986; Engel, 1982; Matei, 2009; Sani, Hassan & and Azam, 2016) and their approaches in modelling financial time series with an autoregressive structure that observed heteroskedasticity over different time may be autocorrelated.

In developing an ARCH model, two distinct specifications are considered; these are conditional mean and conditional variance. In generalizing this, the standard GARCH *(p,q)* specification is depicted as in Equation [10]

[10] $$y_t = \gamma + \sum_{i=1}^{q} \eta_i x_{t-1} + \varepsilon_t$$

where γ is the mean with other exogenous variables assumed to be zero, x_{t-1} the exogenous variables and ε_t the error term. The ε_t is thus explained as in Equation [11]

[11] $$\varepsilon_t \approx N(0, \sigma_t^2)$$

The σ_t^2 which explained the conditional variance of the error term in Equation [11] is further expressed as in Equation [12]

[12] $$\sigma_t^2 = \varpi + \sum_{i-1}^{p} \gamma_t \varepsilon_t^2 + \sum_{i-1}^{q} \beta_t \sigma_{t-1}^2$$

where σ_t^2 is the one period ahead forecast based on past information or the conditional variance, ϖ is the constant taken as mean with other exogenous variables assume to be zero, and γ is the previous period volatility the ARCH term and β the coefficient of the forecast variance the GARCH term, respectively.

This study test current exchange rate volatility and its conditional volatility in periods ahead using the Nelson (1991) Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model. Also, the first order difference measurement approach of exchange rate volatility used by Arize, Malindretos, and Slottje (2008) is adopted for the measuring of exchange rate volatility. These scholars posited that exchange rate volatility is determined by the previous year exchange rate volatility. In corroboration, Serenis and Tsounis (2014) believed that exchange rate volatility (variance series) takes a non-negative since the estimate of the conditional variance leverage effect are exponential instead of quadratic as depicted in Equation [13].

[13] $$\log(y_t) = \gamma + \sum_{i=1}^{q} z_t \left| \frac{u_{t-i}}{\sqrt{y_{t-i}}} \right| + \sum_{i=1}^{p} \vartheta_i \log(y_{t-i})$$

where z_i and ϑ_i are variables that is been estimated and $\log(y_t)$ is the log of the variance series. Adopting and modifying Equation [13] above model in this study, all other independent variables except ϑ_i are held constant as depicted in Equation [14]

[14] $$\log(y_t) = \gamma + \sum_{i=1}^{p} \vartheta_t \log(y_{t-i}) + \sum_{i=1}^{q} z_t \left| \frac{u_{t-i}}{\sqrt{y_{t-i}}} \right|$$

Equation [14] transformed to equation which is the estimable equation for the study objective one which is to examine the relationship between current exchange rate volatility and its conditional volatility in periods ahead. In this study, the presence of volatility clustering is determine by the significance of the lagged volatility series parameters y_t. While the extent of exchange rate volatility is determine by the autoregressive root, which directs the persistence of volatility fluctuations, is the summation of $\gamma + z$ and the indication of volatility degree are expressed as:

If $\gamma + z \to 1$ that is close to one, it indicates volatility is present;

If $\gamma + z > 1$, it implies overshooting volatility; and

If $\gamma + z < 1$, indicates there is no volatility

Thus the transformation of Equation [14] is depicted as in Equation [15]

[15] $$\log ERV_t = \gamma + \alpha \log ERV_{t-1} + \mu_{t-1}^2$$

Equation [15] where α is the coefficient of *ERV* is estimated as the equation examining the relationship between current exchange volatility and its conditional volatility in other period ahead using the EGARCH estimation technique.

3.3.2 Exchange Rate Volatility and External Shock Model

In Equation [5], it was stated that the ER consist of both external and internal balance is a fundamental functions of exogenous variables and policy variables. Version of Equation [5] can empirically be estimated by the applications of the model, although fundamental variables to be included differ across studies. Studies on the ER in developing economies like most countries in African have found that terms of trade which is influenced by shocks such as oil prices, political instability, and financial crisis with some control variables like trade openness, international reserve, government expenditure, and GDP are common factors that explain behaviour of ER (Aron, Elbadawi, & Khan, 1997; Eita & Sichel, 2006; Elbadawi & Sato, 2005; Frankel, 2007; Koranchelian, 2005; Lim, 2006; Mungule, 2004; Opoku-Afari, 2004).

Similarly, studies on other developing countries in Asia and Latin American countries, found that ER to be mainly driven by current account balance industrial productivity growth rate, external shock (oil price, remittance, financial asset failure, political system and natural disaster), trade openness, international reserve and government fiscal account positions (Bergvall, 2004; Defrenot & Yehoue, 2006; Paiva, 2006; Zalduendo, 2006)

This study extend the analysis forward by investigating exchange rate volatility and external shock in Nigeria. External shock variables selected for consideration in the study include foreign reserve (*FR*), political instability (*PI*) and oil price (*OP*). The study also incorporated government expenditure (*GE*), trade openness (*TOP*), financial crisis (*FC*) in line with Kiptui and Kipyegon (2008). Nigeria's *GDP* rate served as a proxy of

internal shocks to ER fluctuations in Nigeria. Taking note of the variables given in Equation [5] and other variables observed in literature, this research answered objective two by adopting the following mathematical function and econometric model specification as represented by Equation [16] and Equation [17], respectively:

[16] $$ERV = f(OP, FC, PI, GE, FR)$$

[17] $$ERV_t = \alpha_0 + \alpha_1 OP_t + \alpha_2 FC_t + \alpha_3 PI + \alpha_4 GE + \alpha_5 FR_t + \varepsilon_t$$

where in ε_t is error term and assumed to be a white-noise process where $\varepsilon_t \approx ii(0, \delta^2 \varepsilon)$ since the mean is equal to zero and variance is constant (Bollerslev, 1986). Meanwhile, α is the coefficient of the respective estimated variables, ERV is exchange rate volatility, OP is oil price, PI stands for political instability, GE is the government expenditure and FR is foreign reserve, respectively.

3.3.3 Capital Inflows and Exchange Rate Volatility Model

Based on the earlier stated theoretical framework and in line with Chuhan, Claessens, and Mamingi (1998) and Fernandez-Arias (1996) measuring approach, domestic factors that can push and pull capital inflows includes foreign reserve, trade openness, domestic currency instability (volatility) among others. Also, these scholars maintained that ΨY represents the external fundamentals such as international interest rate, exchange rate, global financial cycle among others.

Following the extension of Equation [9] by scholars like Anton, Ralph, and Massimo (2010), Kim and Wu (2008) and Ozatay, Ozmen, and Sahinbeyoglu (2009), this study adopted and modify the extension to address objective three as presented mathematically and econometrically in Equation [18] and Equation [19], respectively:

[18] $CI = f(ERV, FR, GDP, TOP)$

[19] $CI_t = \alpha_0 + \alpha_1 ERV + \alpha_2 FR + \alpha_3 GDP + \alpha_4 TOP + \varepsilon_t$

where α is the coefficient of the respective estimable variables, CI is capital inflows, ERV is exchange rate volatility, FR is foreign reserve, GDP is the gross domestic product, and TOP is the trade openness, respectively. Meanwhile, ε_t is error term and assumed to be a white-noise process (Bollerslev,1986).

3.4 Justification of Variables

In this section, the variables used for estimations are justified and their method of measurement were explained accordingly. The variables used for analysis in this research include exchange rate volatility (ERV), external shock been proxy as crude oil prices (OP), financial crisis (FC) and political instability (PI). Others are capital inflows (CI), foreign reserves (FR), government expenditures (GE), gross domestic product (GDP) and trade openness (TOP). The justification of these variables take the form of their definitions, methods of their measurement, reviewed literature position on them and their expected estimated signs.

3.4.1 Exchange Rate

Exchange rate (ER) is defined in terms of the bilateral nominal and real (adjusted price) exchange rate for the naira vis-à-vis USD. The quarterly data of nominal exchange rate and real exchange rate for naira vis-à-vis USD between 1986 that marked the beginning of real floating exchange rate in Nigeria and 2014 was used. This operational definition is been supported by scholars like Galati *et al.* (2007) who defined exchange rate as the going price a country unit of currency weight against that of her trading partner(s) in terms of economic transaction. The scholars maintained that exchange rate explained on what unit a country currency can be exchanged for currency of her trading partner. In this study, the justification of this variable is for the onward computation of exchange rate volatility which will be the main variable of analysis in the work.

3.4.2 Exchange Rate Volatility

The exchange rate volatility (ERV) is functional defined in this research as the erratic or undulating movement exhibited by exchange rate over a short period of time. Exchange rate volatility variable in literature is popularly generated or measured in three ways; the first order differential method, coefficient of variation method, and the standard deviation measure of exchange rate volatility. The first order differential method of exchange rate volatility method is used in the measurement of the variable in this research. In this method, focus is on the difference between the current logarithm value of exchange rate and the previous exchange rate. Nominal exchange rate is used in this research for the computation of the variable. This position is justified by previous scholars like Serenis and Tsounis (2014) and Demez and Ustaoğlu (2012). These scholars are of the view that

exchange rate volatility measures using this approach always guarantee robust and almost accurate result in analysis. The hypothesis expected sign of exchange rate volatility variable depends on the estimated result of the model.

3.4.3 External Shock

As earlier explained, external shock effects the behaviour of country's exchange rate in form of term of trade. Any shock that improved terms of trade creates conducive export prices. Increase in export earnings led to rise in aggregate demand thus resulting in price increase. Since international markets determined prices of tradable, increase in prices will mainly affect non-tradable leading to appreciation of local currency (Dornbush, 1976; Kiptui & Kipyegon, 2008). Conversely, they are possibility that increase in export earnings could remove foreign exchange constraints thus enabling increase the production of non-traded goods by domestic producers, hence lowering prices of non-traded goods. Unlike the income effects described above, substitution effect, could therefore lead to a depreciation of the currency instead. Since some of external shock determinants increases represent deterioration in terms of trade, the expected sign of the coefficient is a function of the type of external shock as considered in the following.

3.4.3.1 Oil Price

Oil price (OP) is a proxy of external shock and practically defined as the amount paid per barrel of crude oil at the international crude oil market. The first order differential method is used in the measurement of the variable in this research. In this method, focus is on the difference between the current logarithm value of oil price and the previous year oil price. In the context of this study, oil price is the unit per USD payment for Nigeria crude

oil per barrel supplied to as demanded by her trading partners at the international market. Amedu (2010) defined Nigeria oil price as the amount of the USD earned for the sale of a barrel of crude oil to her international customers. Oil price inclusion in the model is justified by its ability of changing the position of the economy from both the demand and the supply sides respectively. To oil exporting country like Nigeria where the sales of her crude oil accounted for over 70 percent of the country's generated revenue; thus, change in its price is of serious important in the explanation of exchange rate behaviour. Data on oil price (OP) was computed from the sale price of Nigeria crude oil at the international market in domestic currency.

In previous research by scholars like Benassy-Quere and Dramane (2014), Seyhun, Murat, and Salim (2012), Aliyu (2010) and Suleiman and Muhammed (2011) reported that for oil exporting countries, increase in the price of oil at the international market depreciate exchange rate volatility level while for the oil importing countries a rise in oil price leads to an appreciation of exchanges rate volatility. Thus, the relationship between oil price change in Nigeria and exchange rate volatility as an oil export should be negative. That is as the oil price increases, exchange rate volatility level decreases. In line with findings of these researches, this study will adopt an apriori expectation of a negative relationship between exchange rate volatility and increase in oil price.

3.4.3.2 Financial Crisis

In the context of this research, financial crisis (FC) as another proxy of external shock is defined as a situation where financial instrument lost their real value and becomes fragile to support the real economic sector. In Nigeria, during financial crisis periods, value of

assets falls, this leads to fall in both consumption and production. Private sector (the real sector) assets value were eroded thereby hindering production. Accordingly, the consumers are faced with weak financial muscle as the Nigeria government finds it very difficult to uphold her financial obligation. Previous studies researchers like Azid (2005) and Hau (2002) defined financial crisis as a situations in which nominal value of some financial assets suddenly get withered away. They believed that it is a situation whereby economic activities of country reduces as a result of cash unavailability. Similarly, Alessandro and Costas (2015) submitted that the recent financial crisis is the end point of USA mortgage default which cumulated into global credit collapse and finally the global economy. Financial crisis can always be associated with currency crisis, banking panics, stock markets crashes and sometimes financial bubbles (Candarelli, Elekdag, & Lall, 2010).

Financial crisis have been tested on exchange rate as independent variable by many previous studies like Joseph (2011), Kohler (2010) and Bundesbank (2010). In their analysis, these scholars incorporated the variable as a dummy variable. This implies that when there is financial crisis the variable take the value of one and zero when otherwise. Also, these scholars found that when there is financial crisis, there would be a decline or collapse in economic activity and export will be affected drastically.

In this research, measurement method of Joseph (2011), Kohler (2010) and Bundesbank (2010) and is adopted. According to these authors, financial crisis is measured as a dummy variable. This implies that defined period of financial crisis is denoted as one and

absent of financial crisis is denoted as zero. The expected sign of estimation of this variable is a positive sign since an increase in its occurrence leads to an increase in exchange rate volatility.

3.4.3.3 Political Instability

In this study, political instability is the absent of government significant present in the discharge of her civil, social and political responsibilities. It is also functionally viewed as the inability of the Nigeria government to provide security for the people and their property, when there is a threat, lack of observation of the rule of law by the state and prevalent of abuse of power by the state. Previous study by Wood and Gibney (2013) opined that political instability is the existence of unusual level of political violence and terror experience in any state. The World Governance Indicator (WGI) estimation index method data was adopted and augmented in the measurement of this variable in the study.

The WGI present a database the summarised the views on quality of governance provide by government especially in developing countries. Political instability is measure in this study as annual position of Nigeria on WGI scale. The scale measures government performance in maintaining law and order and management of violence/terrorism on its annually published scale. Governance performance which is measured on a scale that range from -2.5 (weak political stability) to +2.5 (very strong political stability). In this study, the scale is adopted and is now used as a scale of 1 to 5 where scale of 1.0 (very weak) and scale of 5.0 is (very strong). This implies that the lower the point on the scale, the higher the level of political instability and the higher the point on the scale, the lower

the level of political instability. Previous studies used political terrorist scale (PTS) to measure the level of political instability.

Wood and Gibney (2013) submitted a positive relationship between political instability and exchange rate volatility. Scholars like Blomberg, Frieden, and Stein (2000) and Faia (2007) setting political instability as a dummy variable in their study, submitted that political instability distort both the demand and supply level in an economy. They emphasized that when the level of political instability is high, the economy performance would be low due to poor inflow of capital and foreign investment. The economy would be weak and cannot compete with other economies of the world. In their view, the higher the level of political instability, the more exchange rate depreciates.

In their own contribution, Aisen and Veiga (2008) believed that a positive relationship exist between exchange rate and high level of political instability. The higher the level of political instability, the higher the level of exchange rate volatility. In line with the work of the previous scholars, the variable would be measured as a dummy variable in this study. This implies that when there is political instability the value of the variable would be one and zero if otherwise. The variable apriori expectation in this research is a positive relationship with exchange rate.

3.4.4 Capital Inflows

Capital inflows is the officially documented net foreign capital that enter Nigeria's economy during the studies period on annual basis. Capital inflows can be measured as total remittance, foreign direct investment (FDI), equity (foreign equity), bonds (local

bond obtained by foreign investors), and bank loans (Bank loan) scaled by the total GDP. It can also be generated as net capital inflows to GDP ratio. Total capital inflows is arrived at by stripping out all assets that are not classified by the monetary authority of the country. It means all capital inflows that cannot officially accounted for is not computed. This approach is adopted in this study for its popularity and robust result presentation. It has been used by scholars like Kyongwook, Kyuil, and Seungwon (2013) and Basant (2005) in their respective work on exchange rate volatility and capital inflows in Korea and Singapore respectively. Previous studies by Cardarelli, R., Elekdag and Kose (2009) submitted that in a country-specific analysis, capital inflows can be captured by taking the net ratio of capital inflow by GDP. This method ensures that capital inflows should be large relative to a country's historical experience.

The inclusion of the variable stern from the fact that investment increase productivity and consequently weaken exchange rate volatility effect on the economy. Basant (2005) submitted that capital inflows when properly harnessed stabilized exchange rate. In corroborating this view, Nicolas and Esteban (2015) opined that capital inflows reversal is purgatory not paradise for the host country. Similarly, Kyongwook, Kyuil, and Seungwon (2013) observed that effect of capital inflows based on the needed incubation period can be felt very weak in the short-run but becomes obvious in the long run. However, they posited that capital inflows stabilized exchange rate volatility. Following the path of these earlier submission, the apriori expectation is a negative sign. This implies that increase in capital inflows stabilized ERV.

3.4.5 Trade Openness

In the context of this study, trade openness (TRO) is defined as the degree at which restriction to free and easy trading have been observed by a nation with her trading partner at the international level. It is the rate at which rules and regulation hindering easy and fast international business transactions has either be weaken or removed. Kin and Courage (2014) defined TRO as the measure of trade policy or trade liberalization. They maintained that TRO is the ratio of summation of a country's export and the import by her GDP. In their own contribution, Bown and Crowley (2014) submitted that TRO is a measure of trade policy or trade with little or no restrictions (trade freedom). They maintained that trade freedom in itself implies removing of the various kinds of impediments to international trade. Impediments like trade restriction and reducing of tariffs. Reduction in tariffs encourage lower import prices of tradable and hence appreciation of the currency. Similarly, Chad and Meredith (2014) and Kodongo and Ojah, (2013) submitted separately in their research that trade openness encourages productivity as a result of increase in competition. They emphasised that if the level of trade openness is well organised and emphases are given to trade on most needed goods, trade openness would reduce exchange rate volatility in the long run.

Corroborating their assertion, Jerven (2014) used statistic on trade in some selected Africa countries argued that trade openness is an antidote to exchange rate volatility in the studied countries in both the short and long run. This implies that, ERV is negatively related to trade openness. In this study, trade openness is measured as the ratio of Nigeria's total trading transactions (import and export) by her GDP. The apriori

expectation in this research in line with the finding of previous research is a negative sign for the variable.

3.4.6 Foreign Reserve

Contextually, Nigeria foreign reserves (FR) also referred to as international reserves, external reserves or foreign exchange reserves is the total financial reserve of the country in the USD by the Nigeria apex bank the Central Bank of Nigeria (CBN). It can also be defined as the total gold reserve by the CBN. Some scholars like Berkmen, Gelos, Rennhack and Walsh (2012), Chang and Velasco (2005) and MacDonald and Taylor (1991) believed it is the accumulation of surplus revenue in another countries currency by a country. Others like Dominguez, Hashimoto and Ito (2012), Katusiime, Shamsuddin and Agbola (2015) viewed it as the deposit of foreign currency held by a country apex bank. These scholars maintained that holding currency of other countries as assets by a country allows the government of such country to keep their currency stable and reduced effect of shock and exchange rate volatility.

Subsequently, this measure of stabilizing the economy became popular after the decline in the popularity of gold standard. But the most widely accepted definition was the practical postulation by the International Monetary Fund (IMF). IMF (2013) defined international reserves as consisting of official public sector foreign assets that are readily available to, and controlled by the monetary authorities, for direct financing of payment imbalances, and directly regulating the magnitude of such imbalances, through intervention in the exchange markets to affect the currency exchange rate or for other

purposes. Ito and Chinn (2014) summarized in his own submission that the higher the rate of the foreign reserve the stronger will be the strength of a country's currency.

In this study, Nigeria's FR would be measured by the foreign bank note, foreign bank deposits, foreign treasure bills, special withdrawal and the long and short term government security saved by the CBN. In this research, international reserve will be the summation of foreign bank deposit, foreign deposit and foreign treasure bill of Nigeria been saved by the CBN. The expected coefficient of this variable is then be negative in line with the findings of previous studies. This implies that, as FR increases, exchange rate volatility reduces.

3.4.7 Gross Domestic Product

Gross domestic product (GDP) is practically defined as the aggregate measure of production that equals the sum of the gross value added by all resident, institutional units engaged in production plus any taxes, and minus any subsidies, on products not included in the value of their outputs. GDP can also be viewed as measure of the relative contribution of the industry sector. This is possible because GDP is a measure of 'value added' rather than sales; it adds each firm's value added. GDP has been viewed by scholars like Amir (2013) and Golinelli and Parigi (2014) as the total market value of all the final goods and services produced within an economy in a given year. They maintained that when all the components of GDP are valued at their current prices in the market, it is referred to as nominal GDP but when inflation is taken into consideration in its computation, it is known as real GDP.

GDP inclusion in this study is justified by the link between levels of productivity and exchange rate volatility. Previous by researchers have established a relationship between exchange rate and the growth rate of a country's GDP. Although, there is no general agreement on the direction of the relationship. Lensink (1995), Velasco (1999) and Noy and Nualsri (2008) opined that exchange rate determine the level and amount of what a country can produce if the country relied more on imported raw materials but for a country that relied more on internally generated raw material for production, exchange rate fluctuation have no effect on her GDP. Scholars like Tomlin (2014) and Atems, Kapper, and Lam (2015) believed that GDP determine the rate of exchange rate in a country even been a depended on imported raw material or not. They posited that an increase in the level of a country GDP reduces exchange rate volatility.

In agreement with previous studies submission, GDP can be measured as the productivity growth rate in Nigeria and the expected sign is a negative sign. This implies that, as the level of GDP increases, exchange rate volatility decreases.

3.4.8 Government Expenditure

Government expenditure is the expenses government of Nigeria undertake in order of conducting the business of governance. Previous scholars like Todani and Munyara (2005) viewed government expenditure as the spending on both the tradable and non-tradable product in a country's economy. In this study, government expenditure is measured as the total money expended by the government annually to maintain both social and economic activity of the state. It is the summation of cost of capital and recurrent expenditure during the period of this study, Nigeria's government expenditure

can be measured as the combination of expenses on both the capital and recurrent expenditure by the government in every fiscal year respectively.

The inclusion of this variable is justified as expenditure or spending of the effect productivity in the economy. More spending increase demand and exert upward pressure on price of non-tradable, thus causing an appreciation of exchange rate. Previous scholars like Chen and Rogoff (2002) found a positive relationship between ERV and government relationship and others like Tomlin (2014) submitted a negative relationship. The apriori expectation of this variable depends on the estimated result or the research finding.

3.5 Data

The study uses quarterly data covering the period 1986 to 2014. Data are sourced from the Central Bank of Nigeria (CBN) and the National Bureau of Statistics of Nigeria (NBS). The selected variables included in the analysis ER, GDP, FR, and GE were based on the values as given by the CBN Statistical Bulletin and the annual publication of the NBS of the various years. These data have already been transformed by these agency for onward usage by concern individual or organization. As stated above, the data on capital inflows, import, and export were equally obtained from the CBN statistical bulletin and NBS annual publication of the concerned years. Furthermore data on political instability was obtained from World Governance Indicator (WGI) and Financial Crisis (FC) data as a dummy variable was calculated based on the years of experience in the country.

3.6 Method of Analysis

In this section, detailed explanation on the method that was employed to examine the various equation that represent the study's objectives were given. The study used system of equations comprising; current ERV and its conditional volatility in periods ahead, ERV and external shock, and capital inflows and ERV. Three approaches of time series methods were implemented for the purpose of analysis in this study; the ARCH, GARCH and EGARCH form methods. The EGARCH is used in estimating Equation [17] which is objective one of the thesis. The Autoregressive Distributive Lag (ARDL) is used in estimating Equation [17] which is the research objective two equation, while, the Johansen Co-integration and Vector Error Correction model (VECM) methods was used to examine Equation [19]. In the systematic procedure of methods two and three, unit root test, descriptive statistic test and correlation test was administered.

3.6.1 Conditional Volatility Measurement

Engel (1982) proposed the ARCH as a response to the problem of explicitly recognizing the difference between conditional and unconditional variance allowing the former to change over time as a function of past error. This technique has been used to observed time series behaviour over time. Bollerslev (1986) believed that the technique proven efficient at estimating at any point in the series error term variance or time series volatility often common with time series data like exchange rate.

However, Campbell and MacKinlay (1997) submitted that studies on fluctuation or volatility that uses method like rolling variance of the concern time series data results are

not only questionable but very unrealistic. They argued that, measuring volatility over some period of time with the assumption of a constant variant is both logically inconsistent and statistically inefficient. It was in response to issues like this that the ARCH and Generalised Autoregressive Conditional Heteroskedasticity (GARCH) was suggested by Engle (1982) and Bollerslev (1986), respectively. These techniques, have the capability of capturing more style of volatility such as leptokurtosis (fat-tail) and volatility clustering.

3.6.1.1 ARCH

In a GARCH technique, process take changes in variances over time as a function of past squared deviations from the mean and past variances. GARCH method assumes that good or bad news have the same effect on the volatility of the model. Technically, the model assume a leverage effect, which means that, positive and negative error term have a systematic effect on the effect of volatility.

Generally, the technique can be specified starting from the GARCH estimating procedure stage. The GARCH *(p,q)* model where *p* is the order of the of the GARCH term *p* and *q* is the order of the ARCH terms or the autoregressive lag. Considering the error process as in Equation [20]

[20] $\varepsilon_t = v_t \sqrt{h_t}$

where E(V $E(v_t) = 0, E(v_t)^2 - 1 or \sigma_v^2 = 1$ and Equation [20] gives Equation [21]

[21] $$h_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i e_{t-1}^2 + \sum_{j=1}^{p} \beta_j h_{t-1}$$

The parameters *p and q* in Equation [21]. GARCH (*p,q*) allows for both AR and MA components in the heteroskedastic variance. Since $\{v_t\}$ is white noise process, the conditional and unconditional mean of error term ε_t are equal to zero as shown in Equation [22]

[22] $$E_t(\varepsilon_t) = E_t[v_t(h_t)^{1/2}] \text{ or } E_t(\varepsilon_t^2) = E_t(v_t^2 h_t)$$

$E_t(\varepsilon_t) = 0$ since $E_t(v_t) = 0$

The conditional variance of ε_t is given by Equation [23]

[23] $$E_{t-1}\varepsilon_t^2 = h_t$$

As shown by Bollerslev (1986), that unconditional variance of ε_t is Equation [24]

[24] $$E_t(\varepsilon_t^2) = E_t(v_t^2 h_t)$$

$$E(\varepsilon_t^2) = \frac{\alpha_0}{1 - \sum_{t=1}^{q} \alpha_i \sum_{j=1}^{q} \beta_j} = \text{constant}$$

To identify and determine the order of GARCH process, the autocorrelation function (ACF) square residuals can be observe as shown by Equation [25]

[25] $$h_t = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1}$$

Successful substitution into the right-hand side of Equation [25] shows that the GARCH (1, 1) is a parsimonious alternative to infinite ARCH *(q)* process as in Equation [26]

[26] $$\frac{\alpha_0}{1-\beta_1} + \alpha_1 \sum_{j=1}^{\infty} \beta_1^{j-1} \varepsilon_{t-1}^2$$

3.6.1.2 GARCH Model

Estimation with GARCH process, consider the two inter related equations of mean that is Equation [22] and the GARCH process equation which is Equation [24], respectively to give Equation [27]

[27] $$y_t = f(x_t) + \varepsilon_t ; \varepsilon_t \mathrm{I}\Omega_t \succ iidN(o, h_t)$$

where $f(x_t) = \beta_0 + \beta x_t ; x_t$ can be an ARMA process of order $\left(p^m, q^m\right)$ and Ω_t certain exogenous variable as in Equation [28]

[28] $$\varepsilon_t = v_t \sqrt{h_t} = v_t \sqrt{\alpha_0 + \sum_{i=1}^{q} \alpha \varepsilon_{t-1} + \sum_{j=1}^{p} \beta h_{t-1}}$$

Estimating the regression model using GARCH is presented as in Equation [29]

[29] $$y_t = \phi_0 + \sum_{i=1}^{q} \phi_i y_{t-i} + \sum_{j=0}^{p} \varpi_j \varepsilon_{t-j} + \varepsilon_t$$

3.6.1.3 EGARCH Model

Exponential Generalised Autoregressive Conditional Heteroskedasticity (EGARCH) was proposed by Nelson (1991) for effective consideration of the leverage effect while computing volatility. Scholars like Berument, Metin-Ozcan and Neyapti (2001) and Kontonikas (2004) believed that EGARCH is the most advantageous and powerful technique to be used in measuring volatility or fluctuation.

In the context of this study, EGARCH technique was employed because of the method's ability to capture the asymmetric in the responsiveness of uncertainty (shock) to good or bad news, the ability of non-imposing non-negative constraints on the parameter and finally, EGARCH technique can estimate uncertainty in the log form which eliminate the outliers' effect from the estimated result.

Nelson (1991) proposed another type of GARCH called EGARCH as response to the inability of the GARCH method to address the leverage effect observed in the financial time series [30]

[30] $$\log \sigma_t^2 = \varpi + \sum_{k=1}^{q} \beta_k g(Z_{t-k}) + \sum_{k=1}^{p} \alpha_k \log \sigma_{t-1}^2$$

where $g(Z_{t-k}) = \vartheta Z_t + \lambda(Z_t - E(Z_t)), \sigma_t^2$ is the conditional variance, $\varpi, \beta, \alpha, \vartheta$ and λ are coefficients and Z_t may be a standard normal variable or come from a generalized error distribution. The formulation for $g(Z_{t-k})$ allows the sign and the magnitude of Z_t

to have separate effects on the volatility. Since $\log \sigma_t^2$ may be negative there are no (fewer) restrictions on the parameters.

Furthermore, the leverage effect represent the asymmetric volatility of the shock; meaning that the effect of good (positive lagged) and bad news (negative lagged) are different. This form the basis for the consideration of the technique in this study. This is depicted in Equation [31]

[31] $$\log y_t = \phi_0 + \sum_{i=1}^{q} \phi_i y_{t-i} + \sum_{j=0}^{p} \varpi_j \log \varepsilon_{t-j} + \gamma \frac{\varepsilon_{t-1}}{y_{t-1}}$$

where $\gamma \frac{\varepsilon_{t-1}}{y_{t-1}}$ is leverage effect which allows the volatility to react more promptly to reductions in the price (bad news) rather than the corresponding increase (good news) and other parameter in Equation [31] remain as earlier defined.

3.6.1.4 Diagnostic Test

To ascertain the presence of ARCH effect, diagnostic tests was conducted. The diagnostic test examine the serial correlation and cross term possibilities in the model. On the ARCH estimation residual, the LM test to ascertain the acceptance or rejection of the null hypothesis.

3.6.2 The Autoregressive Distributive Lag Method

Autoregressive distributive lag (ARDL) is defined as a least squares regression approach involving the lag of both the dependent and independent variables. The ARDL models are normally represented by the notation ARDL $(p_1\ q_1,\ q_2,\ q_3,\ \ldots\ldots q_k)$, where p is the number of lags of the dependent variables, q_1 is the number of the lags of the first independent variable, and q_k is the lags of the *kth* independent variable.

3.6.2.1 Unit Root Test

A unit root test tests whether a time series is non-stationary using an autoregressive (AR) model. In this study, unit root test would be conducted to examine the existence of stochastic non-stationarity in the date series to be used. To conduct a unit root test different approaches can be used. The Dickey–Fuller (DF) test, Augmented Dickey–Fuller (ADF) test, and the Phillips–Perron test. The ADF's test is would use in this research because of its advantages over the other types of unit root test. The ADF's is valid when the data to be use is relatively a large samples size.

Unit root test among others has the following properties of shocks to a unit root process have permanent effects which do not decay as they would if the process were stationary, a unit root process has a variance that depends on *t*, and diverges to infinity and finally a unit root series can be differenced to render it stationary (Damodiar, 2003). Failure to conduct a unit root on a time series date leads to invalid estimation with spurious regression results with high R^2 values and high *t*-ratios yielding results with no economic meaning (Granger & Newbold, 1974).

In this study like every other studies common way of analyzing, the first step is to check for the unit root in the series of the selected variable data. The ADF's test would be conducted on the selected variables to ascertain their stationary level.

In this study, the model of unit root is specified as depicted in Equation [32]

[32] $$x_t = x_{t-1} + e_t$$

Assuming that x_t is random work process, then the regression model of Equation [32] will be represented as Equation [33]

[33] $$\Delta x_t = \alpha + \pi x_{t-1} + e_t$$

where $\pi = (1 - p)$ which under the null hypothesis is bias downward. The significant of the π on the Dickey-Fuller (DF) model. If autocorrelation is observed in the series, Equation [34], Equation [35] and Equation [36], respectively estimate the ADF model:

[34] $$\Delta x_t = \pi x_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta x_{t-1} + e_t$$

[35] $$\Delta x_t = \alpha + \pi x_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta x_{t-1} + e_t$$

[36] $$\Delta x_t = \alpha + \beta t + \pi x_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta x_{t-1} + e_t$$

Equation [23] represents a unit root with intercept and equation [36] represents a unit root unit both trend and intercept respectively. The null hypothesis is that $\Delta x_t = \pi x_{t-1} + e_t$ where $e_t \approx$ NID $(0, \sigma^2)$. The augmentation vector (k > 0) will not affect the asymptomic distribution of the statistic.

In this research as stated earlier the hypothesis of unit root test is H_0: $\pi = 0$ there is no stationarity and H_1 : $\pi < 0$ there is stationarity.

3.6.2.2 Optimal Model Selection

Over the years, in many econometric analysis, the ARDL method has been employed by many scholars and researchers alike. Recent findings have shown that the ARDL model cannot only be used for estimation of long-run relationship alone but can also be used in the estimation of short run and even shocks among economic time series (Narayan, 2005). Narayan (2005), Pesaran, Shin, and Smith (2001) and Pesiran and Shin (1999) opined that the popularity of this estimation method was due to its advantage over other co-integration methods. These scholars believed that over other co-integration methods, ARDL has the advantage of been useful regardless the level of integration of the series. Also, it provides robust result in even a small sample size and well consistent estimates of the long-run coefficients. The starting point of the ARDL model is as shown in Equation [37]

[37] $$\Delta y_t = \beta_0 + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-1} + ...\beta_i \Delta y_{t-j} + \lambda_{11} \Delta y_{t-1} + \lambda_1 \Delta y_{t-1} + ... + \lambda_{1i} \Delta y_{t-j} + \varepsilon_t$$

where ε_t is the autoregressive model error term and Δy_t is the vector of variables employed in the model. Δy_t is explained as change and the lag of itself and as the distributed lag components in the form of successive lags of other explanatory variable. At times, the current value of the explanatory variable itself is omitted from the distributed lag part of the model structure.

Assuming Equation [37] is the derived ARDL model been *(p, q).* Given the present of lagged values of the dependent variables as regressors, OLS estimation of ARDL model will produce a bias coefficient estimates. If the error term ε_t, is autocorrelated, the OLS results will also be spurious and an inconsistent estimation. Obviously in such case, an instrumental variables estimation have to be used in the model estimation.

Using an identified ARDL model to estimate short-run and long-run model, VECM is employed to estimate the short-run and long-run coefficients accordingly. Antonia, Josep, and Raymond (2012) maintained that unlike ARDL, other long-run estimation methods fell short of answering questions related to small size estimation and long-run estimation taking cognizance of shock impact in the short-run without losing focus on the long-run information. In view of these, ARDL suite accurate estimation on short-run, long-run and shock analysis more than other estimation techniques like the Fully Modified OLS (FOLS) by Phillips and Hansen (1990) test, Engel and Granger (1986) and maximum likelihood by Johansen (1988, 1991).

It can be concluded that ARDL model in a univariate co-integration test, account for structural breaks which effect the result of unit root test, jointly test of short-run and long-run effects in a model and also is an appropriate measure of effect of shock in the model (Cheng & Lai, 1993; Reimers, 1992; Reinsel & Ahn, 1992).

3.6.2.3 Optimal Lag Length Selection Criteria

The estimation procedure of the ARDL model is preceded by the determination or selection of the lag length. The ARDL is a variant of the least square regression approach the focus on the lags of both the dependent and the independent variables in a model. ARDL models are generally represented by the notation ARDL $(p, q_{1,} q_2 \ldots\ldots q_j)$ where p represents the dependent variable lag number while $q_1, q_2 \ldots\ldots q_j$ represents the lags for first, second, *jth* independent variables.

The ARDL order will be determined by using the appropriate model selection criteria such as the Akaike Information Criteria (AIC), Schwarz Bayesian Criteria (SBC) or the log-likelihood ratio test (LR). The optimal ARDL lag length used for estimation is determined using appropriate model selection criteria such as AIC, SBC, and LR test. The value of the mentioned test is derived from the Equation [38], Equation [39], and Equation [40], respectively.

[38] $$AIC_p = \frac{-nm}{2}(1+\log 2\pi) - \frac{n}{2}\log\left|\hbar_p\right| - ms$$

[39] $$SBC_p = \frac{-nm}{2}(1+\log 2\pi) - \frac{n}{2}\log\left|\hbar_p\right| - ms\log(n)$$

[40] $$LR_{P.P} = n\log\left|\hbar_{p}\right| - \log\left|\hbar_{p}\right|$$

where p is the maximum order of VAR to be selected in the model $\hbar_0$ is system covariance matrix estimator in the regression, n is sample size, m is the number of parameter in the model, while $\hbar_p$ depicts the function of maximum log-likelihood.

3.6.2.4 Bound Co-integration Test

On a general note, the bound co-integration test of the variables in Equation [17] would be undertaken using the ARDL method as developed by Pesaran, Shin, and Smith (2001) and as depicted by Equation [41]

[41] $$\Delta \ln y_{it} = \lambda_0 + \sum_{i=1}^{n} \lambda_i \Delta \ln y_{it-1} + \sum_{j-1}^{p} \beta_j \ln y_{it-1} + \varepsilon_{it}$$

where $\ln y$ a vector of endogenous variables earlier defined exchange rate volatility and external shock model as in Equation [17]. The Δ is the difference operator. The long run relationship is determined using the *F*-statistic to test the significance of the lagged level variables. The joint significance of the model is to be tested using the hypothesis, $H_0 : y_1 = y_2 = ... = y_6 = 0$

The critical values are to be obtained from Pesaran, Shin, and Smith (2001) or Narayan (2005) for purely level variables 1(0), purely differenced variables 1(1), and mutually co-integrated variables. The null hypothesis of no co-integration is tested against the

alternative based on the *F*-statistics values obtained when compared with the two set of critical values tabulated by Narayan (2005). The two set of critical values are 1(0), the lower critical bound and 1(1), the upper critical bound. If the calculated *F*-statistics surpasses the higher bound, co-integration exists, the null hypothesis would then not be accepted. If calculated *F*-statistics falls below the lower bound, co-integration does not exist. Therefore, we accept the null hypothesis. While the *F*-statistics falls in between the upper and the lower bound, inference of inconclusiveness cannot be made unless the order of integration of the variables is unknown.

If co-integration exists, Equation [17] variables would be estimated. The estimable equation is specified as in Equation [42]

[42]
$$\Delta \ln ERV_t = \alpha_0 + \sum_{i=1}^{k} \alpha_i \Delta \ln ERV_{t-1} + \sum_{i=0}^{k} \alpha_i \Delta \ln OP_{t-1} + \sum_{i=0}^{k} \alpha_i \Delta \ln FC_{t-1} + \sum_{i=0}^{k} \alpha_i \Delta \ln PI_{t-1} + \sum_{i=0}^{k} \alpha_i \Delta \ln GE_{t-1} + \sum_{i=0}^{k} \alpha_i \Delta \ln FR_{t-1} + \delta_1 \ln ERV_{t-1} + \delta_2 \ln OP_{t-1} + \delta_3 \ln FC_{t-1} + \delta_4 \ln PI_{t-1} + \delta_5 \ln GE_{t-1} + \delta_6 \ln FR_{t-1} + \varepsilon_t$$

where the null hypothesis $H_0; \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = 0$ implies there in the model there is no co-integration among the estimated variables and δ is the coefficients of the variables, respectively.

where the alternative hypothesis $H_1 = \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = 0$ implies there in the model there is co-integration among the estimated variables and δ is the coefficients of the estimated parameters, respectively.

3.6.3 The Long-Run Relationship

Long-run elasticity of the model is estimated based on the following ARDL model to investigate the impact of external shock on exchange rate volatility in the long-run. This is depicted as in Equation [43]

[43] $$\Delta \ln y_{it} = \lambda_0 + \sum_{i=1}^{n} \lambda_j \Delta \ln y_{it-1} + \varepsilon_{it}$$

Like in the previous analysis, $\ln y$ here is again a vector of variables log specified in the exchange rate volatility and external shock model in Equation [17] where *j* and *i* equal 1,2, 3,….6.

Long-run equation of the model is as presented by Equation [44]

[44] $$\Delta \ln ERV_t = \alpha_0 + \sum_{i=1}^{k} \beta_i \Delta \ln ERV_{t-1} + \sum_{i=0}^{k} \delta_i \Delta \ln OP_{t-1} + \sum_{i=0}^{k} \gamma_i \Delta \ln FC_{t-1} + \sum_{i=0}^{k} \varphi_i \Delta \ln PI_{t-1} + \sum_{i=0}^{k} \varpi_i \Delta \ln GE_{t-1} + \sum_{i=0}^{k} \tau_i \Delta \ln FR_{t-1} + \varepsilon_t$$

3.6.4 The Short-Run Relationship

The short-run elasticity is estimated using ARDL error correction term of the following general form of Equation [45]

[45] $$\Delta \ln y_{it} = \beta_0 + \sum_{i=1}^{n} \beta_i \Delta \ln y_{it-1} + \lambda ECT_{it-1} + \varepsilon_{it}$$

where $\Delta \ln y_{it}$ is the change in natural log of every variable specified in the exchange rate volatility impact on external shock model over time and ECT_{it-1} is the error correction term in the model. Specifically, the estimated model is represented in Equation [46]

[46] $$\Delta \ln ERV_{it} = \alpha_0 + \sum_{i=1}^{n} \beta_i \Delta \ln OP_{it-1} + \sum_{i=1}^{n} \delta_i \Delta \ln PI_{it-1} + \sum_{i=1}^{n} \varphi_i \Delta \ln FC_{it-1} + \sum_{i=1}^{n} \gamma_i \Delta \ln GE_{it-1} + \sum_{i=1}^{n} \phi_i \Delta \ln FR_{it-1} + \lambda ECT_{it-1} + \varepsilon_{it}$$

ECT_{it-1} measures the effectiveness of the feedback or adjustment mechanism in stabilizing equilibrium in the model. This implies that it explains how the disequilibrium in the model instantaneously converged to equilibrium after a given shock (Narayan, 2005). The higher the magnitude of ECT_{it-1} the faster the speed of adjustment or higher the shock impact on the endogenous variable (Pesaran, Shin, & Smith, 2001).

3.6.5 Diagnostic Checking

To confirm the goodness fit of the ARDL model, diagnostic test and stability were conducted. The diagnostic test investigate the serial correlation, functional form,

normality and Heteroskedasticity associated with the model. Cumulative sum of recursive residuals and Cumulative sum of squares of recursive residuals were employed to validate RESET test in testing the stability of the ARDL model. If the error or the difference between the forecast and the real observation is very small, then it implies that the model is best fit.

3.6.6 Co-integration

These econometric techniques were used in the estimation of objective three of this study. The investigation of existence of a long-run relationship between capital inflows and exchange rate volatility is the main interest for the implementation of these methods. The Johansen cointegration is conducted and the vector error correction methods was equally used to ascertain the Johansen cointegration. However, the basic econometric procedure of stationary testing was conducted on the data using ADF test.

3.6.6.1 Unit Root Test

Explanation of unit root is same as in the second objective of this study. It explains the level of integration of the studied variables. The basic assumptions is conducted. The order of integration with trend, with trend and intercept and without trend and intercept.

3.6.6.2 VECM Lag Length Selection Criteria

Estimating the lag length of autoregressive process for a time series is a crucial econometric exercise in most economic studies. Information criteria are the initial measures that can be opted when selecting the appropriate 'lag length' in a time series. However, conflicting conclusions regarding the 'lag length' when these criteria are

used. David and Juselius (2001) in the context of Johansen cointegration, suggested that the lag length ought to be set such that the VAR residuals are free of autocorrelation, even if this implies longer lags than suggested by the information criteria. The estimation procedure of the Johansen co-integration model will be preceded by the determination or selection of the lag length.

Explanation of lag length selection criterion is same as in the second objective of this study. It explains the level of integration of the studied variables. The basic assumptions is conducted. The appropriate model selection criteria such as the AIC, the SBC, and the LR are the same as in objective two.

3.6.6.3 Long-run Relationship Estimation

The concept of co-integration was first presented by Granger (1981) and subsequently other economist like Engle and Granger (1987), Phillips and Ouliaris (1990) and Johansen (1995) elaborated on this epic discussion. Co-integration is the occurrence in a time series where in two or more series are linked to form an equilibrium relationship spaning in the long-run (Engle & Granger, 1987). Economist before 1980 where conducting estimation without testing for co-integration until Granger and Newbold (1974) epic work spurious estimation. These scholars explained that R^2 will be robust and will not explained the true result of estimation. Testing for co-integration has becomes very important for the following reason. The selected variables data are time series which are bound to have trends either deterministic or stochastic. Since the R^2 statistic used in assessing adequacy of regressions gives substantially misleading results for time series

with trends it becomes necessary to check for the co-integration since de-trending does not remove the spurious regression problem (Nelson & Plosser, 1982).

Mathematically, the set of variables $[Y, X]$ that are integrated at order (1) that is $[Y, X \approx 1(1)]$ and suppose that there is a vector $[\theta_1, \theta_2]$ which gives a linear combination of $[Y, X]$ which is stationary, denoted by Equation [47]

[47] $$\theta_1 Y_t + \theta_2 X_t = \varepsilon_t \approx I(0)$$

where the $[Y, X]$ is the co-integration set and $[\theta_1, \theta_2]$ is the coefficient vector.

If Equation [47] is normalized, it generates Equation [48] as follows

[48] $$Y_t = \frac{\theta_2}{\theta_1} X_t + \varepsilon_t$$

where $\frac{\theta_2}{\theta_1} X_t$ is the log-run or equilibrium value of Y_t

In co-integration analysis, it is know that there exist at most one co-integrating vector. If an estimation have more than one variables there exist a possibility of having more than one co-integrating vector. This implies that for a set of *k 1(1)* variables, there may exist up to *k-1* linearly independent co-integrating vectors or $r \leq k-1$

Also, in a bivariate VAR analysis considering a first-order non-stationary for a $\vec{Y} = (Y_t, X_t)'$. That implies that the matrix equation is given as in Equation [49]

[49] $$\begin{pmatrix} Y_t \\ X_t \end{pmatrix} = \begin{pmatrix} \theta_{11} & \theta_{12} \\ \theta_{21} & \theta 22 \end{pmatrix} \begin{pmatrix} Y_{t-1} \\ X_{t-1} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{pmatrix}$$

The transformation of Equation [49] gives the following matric equation as in Equation [50]

[50] $$\Pi = -\Theta(1) = \begin{pmatrix} \theta_{11} - 1 & \theta_{12} \\ \theta_{21} & \theta_{22} - 1 \end{pmatrix}$$

The co-integrating vector is $\beta' = \begin{pmatrix} \theta_{11} - 1 & \theta_{12} \end{pmatrix}$

The matrix is given by $\Pi = \gamma\beta' = \begin{pmatrix} 1 \\ \dfrac{\theta_{21}}{\theta_{11} - 1} \end{pmatrix} \begin{pmatrix} \theta_{11} - 1 & \theta_{12} \end{pmatrix}$

In testing for co-integration in econometric analysis, different approaches have been used. Testing for co-integration in a single equation, the Engle-Granger approach is commonly used. In this study however the Johansen approach is adopted. Johansen (1991) proposed a technique for testing cointegration. In econometrics, the Johansen test is a widely used procedure for testing cointegration of several, say *k, I(1)* time series. This test permits more than one cointegrating relationship so is more generally preferable to the Engle-Granger which is based on the Dickey-Fuller or the Augmented Dickey-Fuller test for unit roots in the residuals from a single estimated cointegrating relationship.

There are two types of Johansen co-integration test, either with trace or maximum eigenvalue, and the inferences might be a little bit different. The null hypothesis for the trace test is that the number of cointegration vectors is $r = r^* < k$ and the alternative that r

= *k*. Testing proceeds sequentially for *r**=1,2, *jth* term, and the first non-rejection of the null is taken as an estimate of *r*. The null hypothesis for the "maximum eigenvalue" test is as for the trace test but the alternative is *r*=*r**+1 and, again, testing proceeds sequentially for *r**=1,2 *jth* term, with the first non-rejection used as an estimator for *r*. Just like a unit root, there can be a constant term, a trend term, both, or neither in the model. For a general VCEM (*p*) model.

Johansen test can be conducted in two ways. Either with trace or with eigenvalue but the inferences might differ a little. The null hypothesis (H_0) for the trace test is the number of co-integration vectors $r \leq 0$ and the alternative hypothesis (H_1) is $r \geq 0$, while the null hypothesis (H_0) for the eigenvalue test is $r = 0$ and the alternative hypothesis (H_1) is $r \neq 0$.

Generally in co-integration analysis, supposing the K^{th} order vector autoregressive with Gaussian errors generate an n-vector as in Equation [51]

[51] $$Z_t = Z_{1t} + Z_{2t} + Z_{3t} + Z_{4t} \ldots\ldots\ldots Z_{nt}$$

where *Z* is a *(p* x *l)* vector of stochastic variables.

Thus; Equation [51] is as indicated by Equation [52]

[52] $$Z_t = \varpi + \varphi Z_{t-1} + \varphi Z_{t-2} + \varphi Z_{t-3} + \varphi Z_{t-k} + \varepsilon_t \; ; t = 1, 2, 3, 4 \ldots\ldots T$$

where $\varepsilon_t \ldots\ldots \varepsilon_T$ are iid with normal distribution $(0, \sigma^2)$, mean zero and variance constant.

As noted earlier, this study applied the Johansen test is a test for co-integration on the selected variables data. The Johansen test allows for more than one co-integrating vectors. The method also has the capacity of testing series with large sample size (asymptotic properties) which provides a more precise result when compared with the Engle–Granger method.

3.6.6.4 Short-run Relationship Estimation

The vector error correction model (VECM) is a variant of the least square regression approach that focus on the lags of both the dependent and the independent variables in a model. VECM models are generally represented by the notation *(p, q_1, q_2, ……q_j)* where *p* represents the dependent variable lag number while q_1 and q_2 represent the first and second independent variables and q_j represents the *jth* independent variables, respectively.

To distinguish between stationary by linear combination and by differencing, Equation [52] is rewritten in error correction modelling or vector error correction as in Equation [53]

[53] $\Delta Z_t = \varpi + \Gamma_1 \Delta Z_{t-1} + \Gamma_1 \Delta Z_{t-2} + \Gamma_1 \Delta Z_{t-3} + \ldots . \Gamma_1 \Delta Z_{t-k} + \Gamma \mathrm{I} ECT_{t-1} + \varepsilon_t ;\ t = 1, 2, 3, 4 \ldots\ldots T$

where Π is the matrix that contains information about long run relationship among variables in the vector and *ECT* is error correction term generated from the cointegration equation.

Based on Equation [49] information about cointegrating vectors is found in Π. That implies, Π determine how many linear combinations of Z_t vectors are stationary. If the (p x p) matrix Π has rank r equal to zero, then all elements in Z_t are non-stationary. Thus, there exist no cointegration relationship between the variables. If Π is of full rank $r = p$ then all elements of Z_t are stationary. Thus, any combination of the variables results in a stationary series is co-integrated. In the intermediary case, when r < p there r non-zero cointegrating vectors among the elements of Z_t and p-r common stochastic trends. If a non-zero relationship is indicated by the test, a long run relationship is implied.

3.6.6.5 Impulse Response Function

The direct interpretation of VECM results is rather difficult because it is composed of many coefficients thereby making it difficult to understand the dynamics of interaction between the variables. It therefore important to simulate the dynamics effects of the different structural shocks by computing the impulse response function (IRF) (Killian, 2001). It shows the effects over time of a structural shocks on the variable of interest. In most studies, IRF will help to ascertain the shock effects of the variables of interest for a long time. This is very important since impact of some variables takes a longer time to be felt (Johansson, 2010).

IRF are derived from the causal representation of the VAR process. Clearly, the IRF depends n^2 the identification scheme chosen. There are n^2 IRF if the system consist of n variables. Usually, the IRF are represented graphically and are estimated to show the effect of shock on the adjustment path of the variables. In this study, the adjustment of ERV as a results of external shock. This is estimated to measure the shock effect on the future dynamics. It work with $m \times m$ coefficient matrices A_i, in the infinite representation of the following Equations [54] and Equation [55]

[54] $$y_t = A_0 + A_1 y_{t-i} + A_2 y_{t-i} + ...+ A_p y_{t-p} + \varepsilon_t$$

[55] $$y_t = \sum_{j=0}^{\infty} A_j \varepsilon_{t-1} + \sum_{j=0}^{\infty} A y_{t-1}$$

where the matrix of A_j is computed as Equation [56]

[56] $A_j = \eta_1 A_{j-1} + \eta_2 A_{j-2} + ...+ \eta_x A_{j-x}$ $A_j = 0$ for $j < 0$ and $B_j = A_j Q$, for j = 1, 2, ….5.

From Equation [56] the following Cholesky IRF decomposition of shocks ε_t covariance matrix will be considered as $\Sigma = XX'X$ is given as triangular matrix as depicted by Equation [57]

[57] $$y_t = \sum_{j=0}^{\infty} (A_j X)(X^{-1} \varepsilon_{t-1}) + \sum_{j=0}^{\infty} B_j w_{t-j} = \sum_{j=0}^{\infty} A_j \varepsilon_{t-1} + \sum_{j=0}^{\infty} B_j w_{t-j}$$

where $A_j = A_j X, and \varepsilon_t = X^{-1}\varepsilon_t$

From Equation [57], a new ε_t is obtained due to the transformation matrix generated as in Equation [58]

[58] $$E(e_t e_t) = X^{-1}E(e_t e_t)X^{-1} = X^{-1}\sum X^{-1} = 1$$

Therefore the shocks in the equation is orthogonal to each other represented as $\varepsilon_t = (e_{1t}, e_{2t}....e_{mt})$. It implies therefore that for any standard error unit shock at a given period of time *t* to any i^{th} error such as e_{it}, on a given j^{th} variable at $t+N$ is described by the j^{th} element in the following form as shown by Equation [59]

[59] $$A_N e_{mt} = A_N X_{ei}$$

3.6.6.6 Variance Decomposition

This is another instrument used for the interpretation of VECM estimate. Variance decomposition (VD) decomposes the total forecast error variance of a variable into the variance of structural shocks. Its operation is based on the causal representation of VECM model. The number show which percentage of the forecast variance can be attributed to a particular structural shock and thus measure the contribution of each of these shocks to the overall volatility of the concern variable. VD separate the variation in the endogenous variable into the component shocks to the VECM. That is to say, the VD

provides information about relative importance of each random innovation in affecting the variation of the variables in the VECM. The forecast error in VD shows the magnitude of the forecast error or influence of the variables in the VECM model over time (Rusek, 1994).

Furthermore, VD provides information on the magnitude of the contribution of each variable in determining the level of capital inflows in Nigeria. The process of VD shows how relevant for instance ERV when compared to other variables included in the model as they relate to capital inflows. Policy makers and researchers have insight on which of the variable to concentrate on manipulating in order to ensure an efficient result on capital inflows in Nigeria. This process can be estimated using Equation [60].

[60] $$y_{t+1} = A_0 + A_1 y_{t-1} + ... + \varepsilon_{t+1}$$

where conditional expectation of y_{t+1} as the endogenous variable vector generates Equation [61]

[61] $$Ey_{t+1} = A_0 + A_1 y_t$$

Equation [62] is for one period forecasting and Equation [63] is for two period forecast error

[62] $$y_{t+1} - E_t y_{t-1} = \varepsilon_{t+1}$$

[63] $$y_{t+2} + A_0 + A_1 y_{t-1} + + \varepsilon_{t+1} = A_0 + A_1 (A_0 + A_1 + A_1 y_t + \varepsilon_{t+1}) + \varepsilon_{t+2}$$

where y_t depicts the endogenous variables vector. Generally, the i^{th} term for VD is represented by Equation [64]:

[64] $$y_{ij} N = \frac{\sum_t^N (e_i^{'} X_{ej})^2}{\sum_t^N e_i^{'} A_t \sum A_t e_t}, i, j = 1,2,...m$$

where $y_{it} N$ represent the magnitude of the *N* step forecast ahead for every variable *I* accounted for the innovation of another variable *j*. The Cholesky decomposition of $\sum XX^{'}$ is defined as $X, A_\ell \ell = 0,1,2.....$ are the coefficient matrices in VAR model, the symbols $e_t^{'} A_\ell \sum A_\ell^{'}$. represent the i^{th} elements diagonal in the matrix $A_\ell \sum A_\ell^{'}$.

3.6.6.7 Diagnostic test

To ascertain the goodness of the co-integration test and VECM tests results, diagnostic tests were conducted. The diagnostic test examine the serial correlation and cross term possibilities in the model. The serial correlation tests was conducted using the LM test on the estimate residuals of estimation. The null hypothesis failed to be rejected since the test results were not statistically significant. Also, the cross term test on the residual of estimates was conducted using the heteroskedasticity test. The results show that the null hypothesis failed to rejected since the test results is not significant implying that there is no heteroskedasticity in the model used in the estimation. Furthermore, the VECM estimation was conducted on Equation [14] to further confirm the results from co-

integration estimation. This help in ascertaining the proper existence of long-run relationship between the dependent and the independent variables.

3.7 Conclusion

In this chapter, explicit explanation on the methodology to be adopted in this research is presented. Theoretical framework and specific model used for examination of the various objectives of the study were discussed. Justification of the selected variables in the model as well as the data were also explained. The various methods used in the estimations of the thesis stated objectives and the various steps needed before embarking on the model estimation were also explained in this chapter.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

This chapter is concerned with the investigation and discussion on the results obtained. The chapter is broadly divided into five main sections. Section 4.1 is this introduction. Section 4.2 deals with the discussion on volatility which is the objective one of the study. Section 4.3 discusses the estimation results of ARDL and Section 4.4 explains the co-integration analysis. Section 4.5 marks the end of the chapter which is the conclusion section of the chapter.

4.2 Volatility Analysis

The pivotal attention of this section is on the investigation of exchange rate volatility (ERV) and its conditional volatility in the future. As stated in study objective one, to investigate the relationship between current exchanges rate volatility and its conditional volatility in other periods ahead. Unit roots was conducted on the data on ERV for its stationarity and the results was equally discussed. In addition, ARCH effect and EGARCH estimation Equation [15] results were discussed. Finally, the conditional standard deviation test graph was plotted and explained.

4.2.1 ARCH Effect Test Results

In this study, the AR (1) test was conducted on the data and the result's residual was equally test for serial correlation. The result in Table 4.1 shows that the null hypothesis failed to be rejected since the result is statistically significant at five percent. This result

indicated that there is no serial correlation in the data that has been estimated thus GARCH estimation can be conducted on the data.

Table 4.1
Breusch-Godfrey Serial Correlation Test Result

***F*-statistic**	**Obs****R*-squared**	**Prob. *F*(1,112)**	**Prob. χ^2 (1)**
41.091	30.867	0.000	0.000

4.2.2 EGARCH Estimation Results

In this study, the EGARCH tests which is the exponential form of GARCH estimation was conducted on the data after the ARCH effect test has been conducted to ensure model adequacy. The results of the estimation is presented in Table 4.2. The results shows that the mean equation is positive and significant at five percent level of significance. The previous forecast error (GARCH term) is equally positive and significant at five percent level of significance. Furthermore, the result of information on exchange rate volatility as measured by the squared residual indicated a positive and statistically significant result at five percent level of significance. In addition, the sum of squared error and conditional variance coefficient is at unity. This occurrence implies that volatility shocks are highly persistent suggesting the presence of volatility clustering.

The results in Table 4.2 indicated there is a positive relationship between current ERV and its conditional volatility in the period ahead. The relationship is statistically significant based on the *z*-statistic and probability of the GARCH term results and the squared residual results. Conditional variance and previous information as measured by the squared residual both have a positive coefficient and highly statistically significant

probability value at five percent level of significance indicated that previous forecast error affect the present the present forecast error positively. Thus, the present ERV has a positive impact on its conditional volatility in other periods ahead. Also, the estimated mean equation shows that volatility shocks are highly persistent implying that the presence of clustering along the mean. This indicated that a period of large (small) change in ERV is accompanied by a large (small) change in ERV over a long period. This results also buttressed the point that current ERV influences it conditional volatility in periods ahead.

Table 4.2
EGARCH Test Result

Variable	Coefficient	Std. Error	z-statistic	Prob.
C	19819.06	247966	0.000	0.999
AR(1)	1.000	0.040	24.595	0.000*
	Variance Equation			
C	1.578	0.580	2.719	0.006*
RESID(-1)^2	0.959	0.196	4.883	0.000*
GARCH(-1)	0.376	0.048	7.803	0.000*

Note:* denotes significant at five percent.

The research findings explained the ERV scenario in Nigeria. Ever since the introduction of floating exchange rate in Nigeria, exchange rate has experienced volatility. In Nigeria, ERV has always been followed by other volatility. Remarkably, was the volatility experienced by exchange rate in 2007 generated a more volatility in 2008 as depicted in figure 4.1. This result agrees with the research expected positive sign that current ERV stimulate its conditional volatility in the period ahead.

Theoretically, the standard Dornbusch (1976) supported this finding in respect of its observation that unanticipated shock generate variations in exchange rate. Empirically, the study's finding follows previous research submissions by scholars of exchange rate analysis. The implication of this finding on the overshooting theory is that it proved that the stickiness of stock value in the present of a shock does not hold as posited by the theory. This implies that current exchange rate volatility overshoot its conditional volatility in other periods ahead. Current volatility leads to a more future volatility. For instance, scholars like Dimitrios and Nicholas (2014) in their analysis using first order difference approach in measuring of ERV and GARCH techniques for the estimation of impact of current volatility on future volatility, opined that current ERV positively influenced it conditional future volatility. These scholars argued that if an economy is challenged with volatile exchange rate condition, the condition get deepened with time as more and more volatilities would be generated by the current ones.

In addition, Grossmann, Love, and Alexei (2014) and Almukhtar (2013) submitted in their separate research that volatile exchange rate when generated dictate its conditional volatility in the future. However, they maintained that the magnitude of influence current ERV has on its conditional volatility varies with countries. In their submission, they posited that developing economies ERV often have positive and strong influence on its conditional volatility in periods ahead only in the short-run. In developed economies, ERV and its conditional volatility in periods ahead experienced a weak an insignificant relationship in both short-run and long-run.

On the other hand, however, Almukhtar (2013) and Aliyu *et al.* (2013) maintained that current ERV has a very strong influence on its conditional volatility in both developing and developed economies. In his submission, Almukhtar (2013) stated that after a large (small) volatility there is always a reoccurrence of another large (small) volatility in respect of the economy involved. Aliyu *et al.* (2013) in their own reported maintained that ERV positively influenced its own conditional volatility in periods ahead as has been classically explained by the Wall Street saga of 2008 and the Enron energy scandal of 1996 both in the USA. They emphasized that ERV influence on its conditional volatility in periods ahead is not a function of whether developed or not developed is a nation. These previous submissions all give credence to this study's findings that ERV positively and significantly influenced its conditional volatility in other periods ahead.

4.2.3 Conditional Standard Deviation Test

Furthermore, conditional standard deviation graph was plotted with the data used for this analysis as depicted on Figure 4.1. As shown by this figure, clustering is obvious and exchange rate exhibit significant periods of high volatility followed by relatively more tranquil period of low volatility during the period of the study.

From 1999 to 2000, exchange rate recorded it highest level of volatility and this was as results of managed and control flexible exchange rate given way for complete floating exchange rate and post-election violence after the returned to democracy. In 2002-2003, the volatility was due crash of Nigeria stock market. The volatility observed in 2008-2009 as depicted by Figure 4.1 was due to global financial meltdown and the crude oil slump of 2014 causes the volatility of exchange rate level towards the end of this study.

The conditional standard deviation graph confirmed the GARCH results that current ERV statistically and significantly explain its conditional volatility in years ahead.

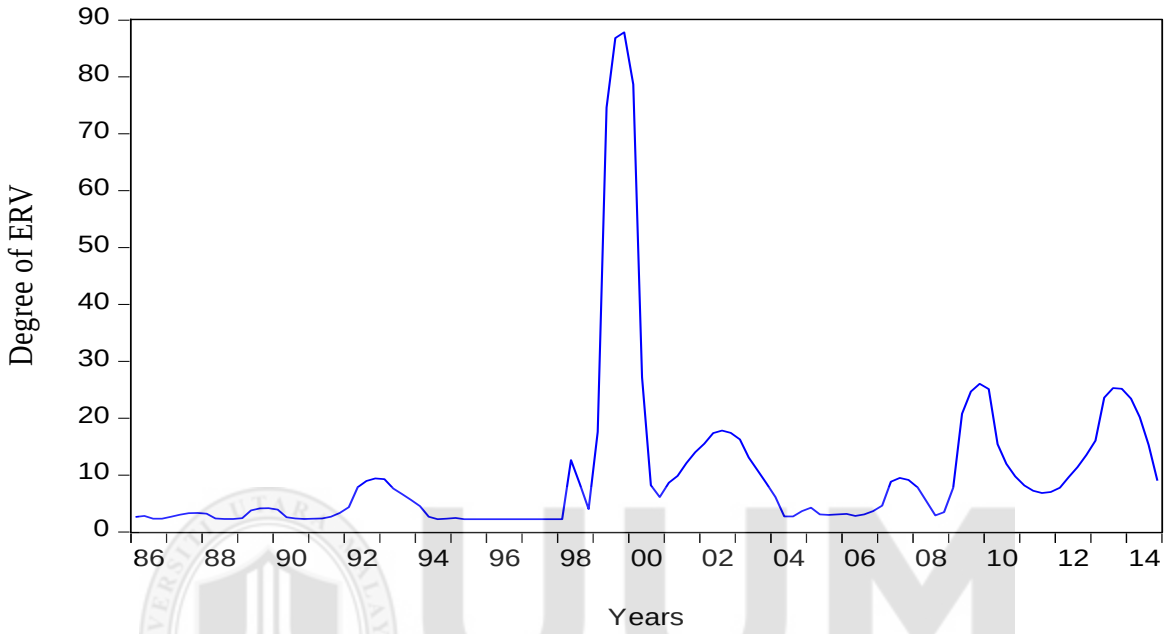


Figure 4.1
Conditional Standard Deviation Graph

This study's finding agrees expected study sign and with previous submission by scholars like Ramcharan (2005), Bachmeire (2008) and Serenis and Tsounis (2012). Ramcharan (2005) using conditional standard deviation graph plotting to observe the behaviour of ERV on its conditional volatility in the periods ahead, concludes that ERV after a boom or bust generate other boom or bust in an economy. In their own contribution, Bachmeire (2008) and Serenis and Tsounis (2012) argued that using a conditional standard deviation graph easily explains the relationship between ERV and it future ERV. They maintained that shocks emitted always generate another shocks until a conscious and deliberate attempt has been put forward to correct them.

From ARCH effect, LM Test, EGARCH, and the conditional deviation test, it can be concluded that exchange rate in Nigeria over the period of study (1986-2014) experienced persistent volatility. The findings indicate the presence of persistent volatility shocks in exchange rate level of the ₦ visa-a-vice the USD varies in terms of degree. This implies that the conventional monetary management policies employed over the study period has proven to be ineffective of stabilizing Nigeria ₦ to the USD.

This research finding indicates the presence of overshooting volatility of exchange rate in Nigeria. From the GARCH result for the measure of ERV reveals the presence of volatility clustering around the mean present volatility can be explained by the dynamics of previous volatility; thus implying that current ERV influences its own volatility in other periods ahead. The GARCH term and the residual squared results revealed a strong presence of volatility fluctuations in the exchange rate for ₦ vis-à-vis the USD in Nigeria based on the first difference measure of volatility.

This finding agrees with the overshooting theory of Dornbusch and empirically supported by previous submission be scholars like Alley, Asekomeh, Mobolaji, and Adeniran (2014), Aliyu (2010) and Arize, Osang, and Slottje (2000). Aliyu (2010) in his submission believed that ERV in Nigeria is a function of previous volatility as a result of continuous usage of an ineffective monetary policy. Current volatility defined its conditional volatility in the years ahead. On the other hand, Arize, Osang, and Slottje (2000) opined that ERV among other exogenous variables is the function of the previous year ERV.

4.3 Exchange Rate Volatility and External Shock

This section focuses on the discussion of results from the investigation on the impact of external shock on ERV in Nigeria using the ARDL model. The investigation is based on the understanding that external shock has been proxied as political instability, financial crisis, and oil price fluctuations. However, additional variables like foreign reserve and government expenditure were used as controlled variables. This is in line with Equation [10] been an extension of Equation [17] as adopted by Frankel (2007), Lim (2006), Opoku-Afari (2004), and Mungule (2004).

4.3.1 Descriptive Statistics

This section explains the degree of confidence and reliability of the data set employed in this study. Descriptive statistics test have been conducted on the data for analysis and the results as presented as in Table 4.3.

The mean results of the estimated ERV is lower than standard deviation which is the measure of the dispersion among the data in the series. This was as result of the difference between the minimum value and maximum value of ERV data in the series is so wide during the period of the study. This implies that, in the series, there is existence of volatility and the group can be estimated for volatility. In Nigeria, this result confirmed the experience of ERV over the years. ERV was so high especially during the period of change of government in 1999-2000, global financial meltdown of 2008-2009, and towards the end of 2014 due to perverse cases of political tensions and oil price crash at the international market.

Table 4.3
Descriptive Statistic Result

Variables	Mean	Standard Deviation	Minimum	Maximum
ERV	6.519	14.126	11.008	74.905
FC	0.275	0.428	0.000	1.000
FR	19.763	20.338	12.423	59.166
GE	179.610	155.123	457.219	847.290
OP	39.521	33.662	11.895	157.732
PI	1.534	0.598	0.246	2.283

The standard deviation of ERV shows that as long as the margin between the maximum value and the minimum value get wider, the variable would remain volatile. This implies that volatility will persist after a previous volatility if the gap between the minimum and maximum value is bridged. The results explained that the previous ERV can generate another ERV in the future if not well control and managed. Ramcharan (2005) is of the view that current ERV encourages more in the future if not properly handled.

In the case of political instability (PI) in Nigeria, the estimated descriptive statistics depict that the mean is higher than the standard deviation. This implies that PI case can be worse than the expected average in the period under study. The gap between the minimum and maximum values shows lack of stability in the series over the study period. The variables standard deviation value shows that there is no normality in the data distribution of the series. This implies that the variable over the study period is not really stable confirming the result of the gap between the series minimum and maximum values. This occurrence also explained the trend of the variable in Nigeria. The period of military transition to democracy 1999-2000, agitation by various ethnics groups in Nigeria and the activities of Boko Haram insurgence was responsible for this unstable trend of the

variable. The maximum value of PI variable encouraged ERV in the country. An increase in PI, reduces productivity thereby galvanizing ERV.

This descriptive statistic finding inveterate the position of Erkens, Hung, and Matos (2012) who submitted that high PI increases ERV. The above submissions agreed with the results of this study's descriptive statistics on these variables. These scholars are of the opinions that even though attention of many developing countries are on stabilizing exchange rate via management of the monetary policies and rules guiding the financial sector, attention must also been given to the management of PI for it plays a very strong role in the determination of ERV. They submitted that serious attention needed to be channelled toward stabilizing the political instability for it determine the level of productivity which in turn influences ERV the more.

Furthermore, OP standard deviation value hovers below the mean value. This means that the difference between the maximum value and the minimum value is wide and sharp during the study period. There is high case of fluctuation in the price of oil during the period under study. The present of no stability in the series, implies that the series can be estimated for volatility. This results explained the existence of glut and boom in the oil price market for Nigeria oil. This finding agrees with previously submitted report by Coudert (2013) that opined that price of oil can never be stable but can constantly be exposed to perpetual fluctuations.

Financial crisis was proxy as a dummy variable. As a dummy variable, the descriptive statistics results explanation is not very necessary for the value ranges between one and zero. The expected explanation based on the minimum and maximum values is not really important since it is just zero and one.

4.3.2 Correlation Analysis

The correlation coefficient as calculated for the variables indicate a relatively strong association between the depending variable ERV and the independent variables as depicted in Table 4.4.

Table 4.4
Correlation Matrix Result

Variables	*ERV*	*OP*	*PI*	*FC*	*GE*	*FR*
ERV	1.000 -					
OP	-0.149 (0.019)	1.000 -				
PI	0.065 (0.048)	-0.462 (0.000)	1.000 -			
FC	0.112 (0.027)	-0.293 (0.001)	0.276 (0.002)	1.00		
GE	-0.180 (0.052)	0.831 (0.000)	-0.577 (0.000)	-0.252 (0.005)	1.000 -	
FR	-0.007 (0.009)	0.714 (0.000)	-0.544 (0.000)	-0.084 (0.369)	0.319 (0.000)	1.000 -

Note: Figures in parentheses are probability values (*p*-values)

From the table, it can be concluded that, the correlation among the variables of interest is relatively high, such as the association between ERV and variables like FC, PI and OP. The probability value of association correlation among the variables falls below five percent level of significance.

4.3.3 Unit Root Test

It has been observed that macroeconomic data usually exhibit stochastic trend that can be removed through differencing. In this study, ADF test was applied to estimate the presence of non stationarity in the model, test for the stationary of the variable at different levels of significance and test for order of integration of the variable in the model. The results is illustrated with the aid of Table 4.5.

From Table 4.5, results of analysis on the level of integration of all the variables is presented. Analysis was conducted on data with view to trace possibility of intercepts, intercept and trend and no intercept and no trend among data of the estimated variables. From the results, all the variable integrated at their first difference with the three approaches used.

ERV variable while integrating at five percent with intercept, integrated at one percent with intercept and trend and no intercept and no trend respectively. Also PI integrated at five percent when tested with trend and intercept and with trend respectively but without trend and intercept, the variable integrated at one percent. The remaining variables all integrated at order one with no trend and intercept. The shows that all the variables at first difference integrate without trend and intercept.

Table 4.5
Unit Root Test Results

Variable	Intercept		Intercept and Trend		Without Trend and Intercept	
	Level	First Difference	Level	First Difference	Level	First Difference
ERV	-2.82	-3.31*	-2.83	-3.28*	-2.14	-6.18*
FC	-3.88	-3.18*	-4.15	-3.45*	-2.40	-4.31*
FR	-2.41	-0.35*	-2.12	-0.28*	-1.66	-6.05*
GE	-0.40	-1.35*	-1.98	-0.88*	1.89	-5.21*
OP	-1.14	-5.38*	-2.76	-4.68*	0.67	-4.15*
PI	-2.66	-1.93*	-3.87	-1.92*	-2.72	-6.19*

Note: * indicates significant at five percent level of significance.

4.3.4 ARDL Lag Length Selection

With this result from Table 4.6, estimation of VAR lag length selection was conducted and subsequently the estimation of the ARDL model accordingly. From the lag selection results in Table 4.6, lag two was selected by all the selection criterion.

Table 4.6
VAR Lag Length Selection Result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2262.824	NA	6.61e+08	40.173	40.342	40.242
1	-1119.061	2125.577	19.544	20.797	22.149	21.346
2	-905.022	371.252*	10.113*	17.876*	20.410*	18.904*
3	-876.093	46.593	0.202	18.231	21.948	19.740

Note: * indicates lag order selected by the criterion, LR: Sequential modified LR test statistic (each test at 5% level of significance), FPE: Final predictor error, AIC: Akaike information criterion, SC: Schwarz information criterion and HQ: Hannan-Quinn information criterion respectively.

4.3.5 The ARDL Optimal Model

This section deals with the selection of optimum ARDL model for the purpose of the analysis. The respective optimum model that will best analyse the impact of external shocks on ERV is generated as depicted in Table 4.7. The model also, gives the outcome of the diagnostic test used in the estimation.

Following Pesaran, Shin, and Smith (2001), the ARDL optimal model level order ARDL for impact of external shock on ERV in Nigeria is model (3,1,0,0,1,1). From this ARDL optimal model level order ARDL model, the relationship between the estimated variable can easily be ascertained.

Table 4.7
ARDL Optimal Model

Variables	**Coefficient**	**Standard Error**	***t*-statistic**	**Prob.***
ERV(-1)	1.049	0.087	12.047	0.000*
ERV(-2)	-0.141	0.130	-1.080	0.282
ERV(-3)	-0.239	0.085	-2.812	0.005*
OP	-0.226	0.076	-2.958	0.003*
OP(-1)	0.244	0.083	2.936	0.004*
PI	2.615	1.267	2.064	0.081**
FC	0.141	0.061	2.314	0.000**
GE	-18.737	5.308	-3.530	0.000*
GE(-1)	16.528	5.384	3.070	0.002*
FR	1.213	0.364	3.333	0.001*
FR(-1)	-1.336	0.366	-3.105	0.002*
C	6.234	3.885	1.606	0.114

Note: * and ** signifies five percent and 10 percent level of significance, respectively.

4.3.6 ARDL Bound Test

The ARDL bound test is aimed at establishing the existence of co-integration between and amongst the dependent and independent variables as explained in Equation [17]. This is achieved with the aid of the *F*-statistic bounds approach by Narayan (2005) as in Equation [40]. Established co-integration relationship exist among variables if the calculated *F*-statistics is higher than the upper bound critical values as calculated by Narayan (2005). He opined that when the calculated *F*-statistics is less than the lower bound critical value or falls in between the results indicate no co-integration and inconclusive accordingly.

Table 4.8
Bound Test Critical Value Results

Variables	Level of Significance					
	F-statistic	Percent	1(0) A	1(1) A	1(0) B	1(1) B
F_{ERV}(ERV,OP,FC,PI,GDP,FR)	8.13**	1%	3.44	4.68	3.73	5.16
F_{OP}(OP,ERV,FC,PI,GDP,FR)	7.88**	5%	2.62	3.78	2.79	4.02
F_{FC}(FC,ERV,OP,PI,GDP,FR,)	1.47	10%	2.26	3.35	2.36	3.50
F_{PI}(PI,ERV,OP, FC,GDP,FR)	1.97					
F_{GDP}(GDP,ERV,OP,FC,PI,FR)	4.77*					
F_{FR}(FR,ERV,OP,FC,PI,GDP)	1.16					

Note: ** and ** indicate the presence of long-run relationship at five and 10 percent level of significance. A is Pesaran. *et al.* and B is Narayan critical bond values, respectively.

In their own contribution, Pesaran, Shin, and Smith (2001), observed that for small sample size analysis, result based on the ARDL critical value sometimes are misleading for the ARDL critical value sample size is relatively large.

Table 4.8 displays the *F*-statistics bound test for Equation [17] defined variables. The dependent variable ERV proved to have co-integrating relationship with the independent variables in the model. From the table, the calculated *F*-statistics 8.13 is higher than both the Pesaran, Shin, and Smith (2001) and Narayan (2005) upper critical level of five percent level of significance. This there vindicates that there is a long run relationship between ERV and external shocks in Nigeria. In addition, all the other variables were estimated to establish existence of more co-integration in the model. In Table 4.8, two estimation *F*-statistics values are more than the upper bound critical values of both Pesaran, Shin, and Smith (2001) and Narayan (2005). This further confirmed the existence of long-run relationship between the independent and the dependent variables in the model.

4.3.7 Long-run Relationship Estimation

Co-integrating equation of the optimal ARDL equation model was estimated to confirm the long-run coefficients of the parameters dynamics. The ARDL optimal equation long-run coefficient results is as depicted in Table 4.9. This table shows that the variable after convergence at equilibrium in the short-run, exhibit stability in the long-run.

Basically external shock via it proxies influences ERV through its ability of manipulation productivity processes from both the demand and the supply side. From the underpinning theory perspective, which opined that absents goods market and money market equilibrium to establish an equilibrium exchange rate and price leads to monetary expansion. The drop in productivity brought about by the activities of the various components of external shock results in an overshooting of exchange rate.

From Table 4.9, the coefficients of variables of interest, FC, OP, and PI are all statistically significant at 10 percent level of significance respectively. These results agree with the theoretical framework of the study. OP has a negative coefficient of -0.309 which implies a negatively relationship with ERV in the long-run. This implies that increase in the price of oil at the international market will help in stabilizing the volatility of exchange in Nigeria in the long run. The fall in oil price implies a decrease in government spending which invariably decrease the total productivity level in the country. However, when compared to the other variables of interest, it has a weakest contribution in the explanation of ERV.

Table 4.9
Long Run Coefficients Result

Variable	Coefficient	standard Error	*t*-Statistic	Prob.
LOP	-0.309	0.085	-3.636	0.051**
LPI	3.091	1.561	1.981	0.082**
LFC	0.985	0.408	2.415	0.078**
LGE	-6.787	2.270	-2.941	0.004*
LFR	-0.323	0.108	-2.990	0.039*
C	15.288	7.315	2.091	0.098

Note: * and ** indicate significant at five and 10 percent level of significance.

This occurrence might not be far from the possibility that it contribution in the long run might have been crowded out by other macroeconomic policy in the economy (Obadan, 2010). Ekpo and Umoh (2012) in their submission opined that oil price is negatively related to ERV in Nigeria and that the impact is more in the short-run for in the long-run, adaptation to new alternatives are easily sorted out in the country.

Other the other hand, in the long run, financial crisis exhibit a positive relationship with ERV. FC has a positive coefficient of 0.985 that is statistically significant at 10 percent. The coefficient of financial crisis indicated a higher magnitude of influence when compared with OP in term of explaining ERV even in the long run. This implies that in the long-run, an increase in financial crisis exacerbate ERV. McCord (2010) opined that financial crisis effect makes stronger overtime more than when they are generated. He explained this position with evidence from the global financial crisis of 2008 that started as a build-up of some years of stock market failure in USA. In Nigeria, the result of financial crisis is justified by the lukewarm attitude of the government in punishing

corruption case offenders thereby making it interesting for new entrants alongside the old offenders (Agu, 2008). As long as the level of corruption increases, individuals get more interested in unproductive earning putting more pressure on ERV in the long-run.

Furthermore, PI has a positive coefficient that is statistically significant at 10 percent. This implies that PI is positively related to ERV in the long-run in Nigeria. During the period under study, reasonable quantity of productive labour were involved in either insurgency, commercial kidnapping, or militancy activities. These segment of Nigeria population not only enjoy unproductive income but disrupt meaningful productivity process. As shown in Table 4.9 in the long run, PI generated positively influences ERV dynamics of factors.

Mba and Chukwu (2013) in their submission believed that the reason PI positively influences ERV in the long-run can be traced to the fact that basic infrastructure and some long term investment are always destroyed and productive labour displaced during a political unrest. These scholars further explained that these structure hampered productivity in both long and short run. Although, the two control variables GE and FR are negatively related to ERV at five percent level of significant respectively. GDP has the highest impact in explaining the dynamics of ERV than any other variable in the model. This is explained by the fact increase in an economy productivity leads to less dependent of external economy and thus stable exchange rate.

4.3.8 Short-run Relationship Estimation

ARDL co-integrating form equation was used in the estimation of the short-run relationship of external shock and ERV as the second objective of this study. Co-integrating form equation of the ARDL model was estimated to confirm the dynamics of the parameter form of interactions. From the table, the ECT_{t-1} has a negative coefficient that is significant at five percent level of significance. The $ECT_{t-1,}$ as depicted in Table 4.10, shows that 33 percent of the disequilibrium that occurs in the model will be adjusted in the subsequent year. As earlier mentioned, external shock distort the position of ERV through the country productivity level. Any decrease in output encourage importation and consequently appreciating exchange rate. The various proxies of external either increase level of productivity or decrease the level. Also, from earlier explanation, any of the proxies that increase government expenditure or real sector output depreciate exchange rate or otherwise.

This study results also, posited that OP has a negative disequilibrium that is statistically significant at five percent, political instability coefficient is positive and also significant at 10 percent and FC also has a positive coefficient that is statistically significant at five percent. This finding consolidate the present of impact emanating from external shocks to Nigeria ERV.

Table 4.10
ARDL Co-integration Test Result

Variable	Coefficient	Standard Error	*t*-statistic	Prob.
D(ERV(-1))	0.380	0.077	4.925	0.000*
D(ERV(-3))	0.239	0.085	2.812	0.006*
D(OP)	-0.228	0.077	-2.958	0.004*
D(PI)	2.235	1.138	1.976	0.041*
D(FC)	0.143	0.062	2.314	0.068**
D(GE)	-18.737	5.308	-3.530	0.000*
D(FR)	-1.213	0.364	-3.333	0.001*
ECT_{t-1}	-0.331	0.048	-6.864	0.000*

Note: * and ** indicate significant at five and 10 percent level of significance.

Table 4.10 shows that oil price, political instability, and financial crisis have significant effect on ERV. As proxies of external shock, these variables alter the level of productivity thereby increasing the pressure on ERV. OP has a negative and statistically significant coefficient that an increase causes a depreciation of ERV in the short and long run. The shocks from OP that explained the innovations of ERV is negative and statistically significant at five percent level of significance. This implies that increase in oil price leads to a less volatile exchange rate. This can be explained that increase in OP dictates an increase in Nigeria's government revenue that might be available for investment which ultimately leads to increase in productivity. As evidence in the later part of 2014, the sharp drop in revenue from oil as a result of fall in oil price has led to drop in the country GDP growth rate which stood at three percent from six percent and five percent of 2013 and 2012, respectively.

Sharma and Dhakal (1994) in their submission opined that drop in oil price encourage drop in productivity. In their study of oil exporting countries, drop in oil price exacerbate almost all macroeconomics problems like inflation, unemployment, and ERV. In their

own contribution, Ferraro, Rogoff, and Rossi (2012) reported that oil price can comfortably forecast ERV for both oil exporting countries and oil importing countries. In their study, they revealed that oil price increase either put pressure on demanding nation's exchange rate or reduced pressure on supplying nation's exchange rate. To supplying nation like Nigeria, increase in the price of oil implies more foreign currency to boast the country's foreign reserve, government expenditure which consequently led to increase in productivity. Conversely, a drop in the price put pressure on the foreign reserve and government expenditure which consequently led to decrease in productivity. This submission also give credence to the finding of this study.

On the other hand, political instability (PI) from the estimated result has a positive and statistically significant relationship with ERV, thus causes appreciation of ERV. PI shock explains the ERV dynamics positively as an increase in the level of PI in the country generate more ERV. From the estimation results, PI has a positive coefficient which is statistically significant at 10 percent. Among the proxies of external shock, PI has the highest coefficient value. This implies that in the determination of ERV innovation, it commands more influence. Increase in PI leads to a decrease in government spending, cut in real sector productivity, and subsequently an appreciation of exchange rate. This study results indicated that during the period under study, PI exacerbate ERV as country GDP drop tremendously owing to the increase in the activities of Boko Haram, Niger-Delta militants, and commercial kidnapping in Nigeria.

This research findings is supported by previous studies submissions. Alao (2010) submitted that the presence of PI, means presence of panic and uncertainty; a situation that eroded productive hours of labour. In his analysis, he believed that the activities of the militants in the Niger Delta and the Boko Haram have tremendously retard the productivity capacities of industries in the affected regions in Nigeria. Earlier scholars like Aisen and Veiga (2008) and Fosu (2001) opined that existence of political instability creates weakness in nations' currencies via decrease in productivity and increase in foreign goods consumptions. They argued that political unrest increases rate of relocation of investment from affected region or country to a politically stable environment. This implies that the hitherto local goods will now be foreign and its continuous consumption increase pressure on the country's exchange rate.

In his own contribution, Allard, Martinez, and Williams (2012) political instability decreases productivity and thereby encourage volatile exchange rate. In their study provide evidence which suggests that national systems of innovation are most likely to flourish in developed, politically stable countries and less likely to prosper in historically unstable countries. They submitted that national systems of innovations that galvanized output flourished in political stable countries; thus implies ERV depreciate in a politically stable countries.

Furthermore, the study results also, depicted that financial crisis also, causes an appreciation in ERV. In Nigeria, during the period under study, the country experiences stock market crash, money market liquidity crisis, the global financial crisis, and endemic

abuse of public fund. These scenario must have been responsible for the magnitude of influence financial crisis had on ERV. As a result of financial crisis, investment drop, government spending glut, and there is a massive drop in the country growth rate. The study result is supported by other research findings which also posited that financial crisis cripple countries productivity level.

In his contribution, Bamidele and Babatunde (2012) posited that during financial crisis, financial assets loss their value thereby weaken the financial strength to support the real sector and available finance for public spending by the government. These scholars emphasized that in Nigeria, during the global financial meltdown of 2007-2008, the manufacturing sector was confronted shortage of foreign exchange which ultimately frustrate their output capacities of participants in the sector. Tomlin (2014) traced the correlation of productivity and ERV and opined that drop in productivity exacerbate a nation's ERV. He believed that financial glut dampened both public and private spending, which reduced aggregate demand and consequently supply and finally exacerbate a nation's ERV.

Furthermore, the study's finding is also supported by previous submissions like Dominguez, Hashimoto, and Ito (2012), Jinyong and Yong-Cheol (2013) and Kohler (2010) who maintained that financial crisis encourage volatile exchange rate. These scholars purely relying their argument of the postulation of Gully, Shaw and Schumpeter (1974) who believed that finance is the life wire of any organisation or human society and that society that processes inadequate finance cannot adequately produce. Also

emphasized that inadequate producing countries cannot compete thereby ending up been dumping ground for adequately producing country. They submitted that based on the foregoing, inadequate production functional countries' currency would be under pressure. Thus financial crisis dimpled productivity and ultimately aggravate ERV.

It has been taken for granted in the international macroeconomics literature that a high correlation between the exchange rate volatility is evidence in support of the overshooting model of Dornbusch (1976) which emphasizes monetary shocks and sticky prices. The implication of these results to the underpinning overshooting theory is that, exchange rate is not sticky and that an occurrence of shock always led to overshooting of the Nigeria exchange rate. However, external shock, may even be more important than monetary shock particularly for developing countries. This statement holds irrespective of the exchange rate regime a country operates (Paul & Muazu, 2014). The results revealed that most important driver of exchange rate volatility in Nigeria is changes in external shock. The study particularly found an inverse relationship between OP and ERV, suggesting that decreases in OP heighten ERV.

Conclusively, in this analysis of impact of external shocks on ERV in Nigeria, the estimated results shows that variables of interest emerged with the expected signs. Oil price increases, being a proxy has a significant impact on ERV. Being a factor for increase in productivity, increase in the price of oil causes depreciation of ERV in both short and long run. However, PI and FC that dampened prices of traded goods causes an appreciation of ERV also in both short and long run. This implies that in Nigeria, external

shocks have impact on Nigeria ERV. OP has a negative impact on ERV, FC and PI both have positive impact on ERV in Nigeria. This results agreed with the underlining ideal of overshooting theory which holds that disruption to level of productivity exacerbate ERV.

4.3.9 Diagnostic Test

In any econometric time series analysis, results are not just endorsed but series of test have to be conducted to attest the validity of model used and the results obtained (Nelson & Plosser, 1982). In order to validate the results of ARDL optimal model estimation in Table 4.7, the serial correlation, Heteroskedasticity and stability tests were conducted.

4.3.9.1 Serial Correlation Test

The LM test is usually conducted to confirm the presence of serial correlation among the variable used in the estimation. If the test result is significant, meaning there is presence of serial correlation among the estimated variable. This will invalidate the result of the optimal ARDL equation estimation. However, if the test results is insignificant, the ARDL optimal equation estimation result is acceptable since it is devoid of serial correlation. The results of LM test conducted indicated failure to reject the null hypothesis which says that the residuals are not serially correlated.

Table 4.11
Serial Correlation Test

F-statistic	Obs* R-squared	Prob. *F*(2,102)	Prob. χ^2 (2)
1.690	3.657	0.189	0.160

The *F*-statistics probability value of the LM test is insignificant thereby signifying the presence of no serial correlation as depicted in Table 4.11.

4.3.9.2 Heteroskedasticity Test

From table 4.12, the estimated results of the white noise is showed. The results also attest to the presence of homoskedasticity in the model. This means, constant variances are present in the model.

Table 4.12
Heteroskedasticity Test

F-statistic	Obs* R-squared	Prob. *F*(1,111)	Prob. χ^2 (1)
0.234	0.238	0.629	0.625

The null hypothesis also failed to be rejected and the alternative hypothesis rejected since there is no heteroskedasticity in the model.

4.3.9.3 Stability Test

Additionally, stability test was conducted on the parameters of ERV and external shock model over the study period using the Ramsey RESET Test. The result of the estimation shows that the parameters distribution are stable over time.

Table 4.13
Stability Test Results

	Value	d.f	Probability
t-statistic	0.735	103	0.463
F-statistic	0.540	(1, 103)	0.463

Table 4.13 shows that the estimated results is insignificant meaning that there is stability over time. This implies that, long-run relationship exist in the model after the short-run innovation adjustment of the variables.

Accordingly, the cumulative sum of recursive residual (CUSUM) and CUSUM-Q tests were conducted to validate the result of Ramsey RESET Test. Brown and Durbin (1975)

opined that application of CUSUM and its squared confirm the existence of constancy of long-run parameters. If the CUSUM and CUSUM-squared results stays within a significance level of five percent, the estimate are confirmed to be stable. From Figure 2 and Figure 3, both CUSUM and CUSUM-squared stayed within the critical five percent bound for the equation. This indicates the existence of long-run relationship between ERV and external shock.

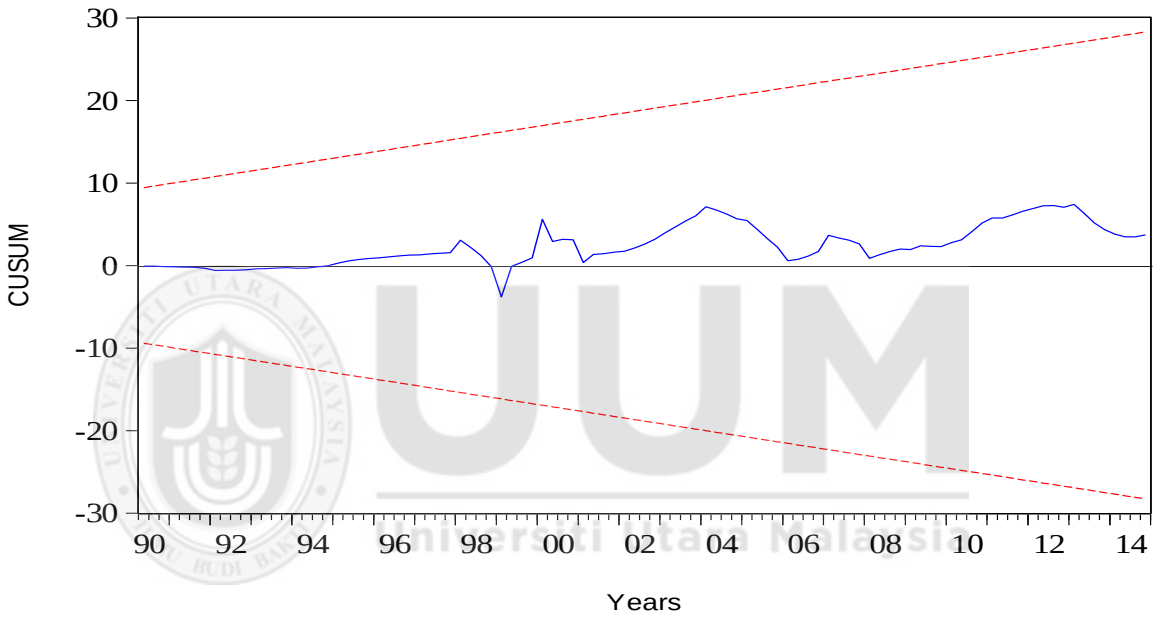


Figure 4.2
CUSUM of Squares at Five Percent Level of Significance

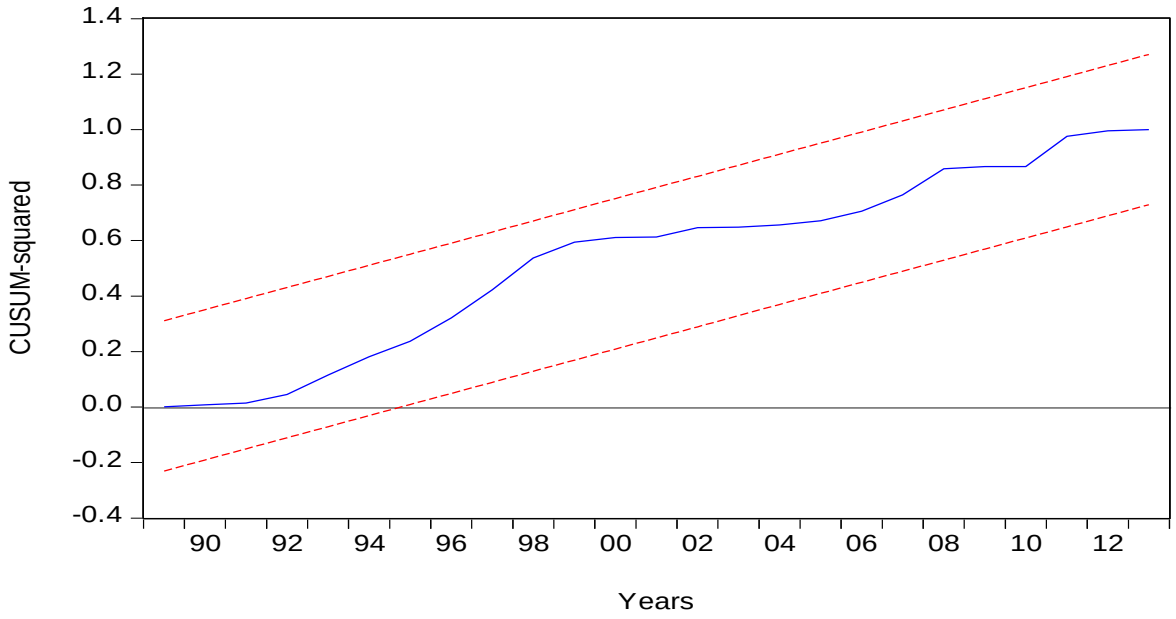


Figure 4.3
CUSUM of Squares at Five Percent Level of Significance

4.4 Effect of Exchange Rate Volatility on Capital Inflows

This section examine the long-run and short-run relationships between capital inflows (CI) and ERV in Nigeria which is objective three of the study. The investigation is based on the established relationship as represented by Equation [19] in Chapter 3. However, additional variables like FR, GDP, and TOP were used as controlled variables.

4.4.1 Descriptive Statistics

This section explains the degree of confidence and reliability of the data set employed in this study. Descriptive statistics test have been conducted on the data for analysis and the results as presented in Table 4.14.

Table 4.14
Descriptive Statistic Test Result

Variables	Means	Standard Deviation	Minmum	Maximum
CL	175.743	124.52	360.581	4091.703
ERV	5.519	14.126	11.008	74.905
FR	19.763	20.338	12.423	59.166
GDP	79.99	155.529	45.204	847.291
TOP	0.37	0.318	0.032	1.014

Table 4.14 describes data on the variables for analysis. The table shows the mean, minimum, maximum, and standard deviation values of individual variables over the period of the study. CI average inflows for the studied period is higher than its standard deviation. This implies that, during the period under investigation, the CI into the economy at sometimes is lower than projected or expected. This situation is further confirmed by the difference between the minimum CI and the maximum CI during the period of study. The gap or difference between the peak inflows of capital and the crest is wide which explained the below average standard deviation. The minimum inflows of capital within this period of study is by all standard below the acceptable world standard.

The table provides an insight that encouragement and real determination need to put place to guarantee reasonable and sustainable CI to bridge the gap. With the return of democracy in 1999, investors' confidence of investing in the country increases, however, this interest rapidly drop towards the end of 2014 as a results of crashed experienced in the price of oil at the international market. Also, the exchange rate volatile nature resulting from the oil price fall can be responsible for the gap. The existence of this gap makes the series not to be stable and hence can be influenced by any other variables. Furthermore, within the study period, the series characteristic depicted instability which

can be traced to capital flight as a result of some macroeconomic variable misbalance in economy (Cardarelli, Elekdag, & Kose, 2009).

Furthermore, from the table, TOP variable also follows the pattern of CI in the description of its mean, minimum, maximum, and standard deviation value. There is a wide difference between the mean value and the standard deviation values. The mean value is higher than the standard deviation value of the data series in the period under study. This is also reflected between minimum and the maximum value as it was in the case of CI in the study period. This occurrence is explained by the intermitted incursion of the foreign technology and labour from developed economy into Nigeria economy and the persistent importation of foreign goods in Nigeria. These occurrence in the TOP variable discourages capital formation in the country. An increase in TOP reduces productivity thereby galvanizing importation; increase in capital flight. Erkens, Hung, and Matos (2012) submitted that high TOP increases capital flight from the home country thereby frustrating CI. The above submissions agreed with the results of the descriptive statistics on the variable.

More so, like the two earlier discussed variables, the association pattern of GDP series value followed the same pattern. The standard deviation value is lower than the average GDP for the group. This is also as the result of the big difference between the minimum GDP value and maximum GDP value within the year of study. This further explained the link between GDP and CI in the economy. When CI is high, the GDP of the economy is always high since it increases GDP via increase in investment (Reisen & Soto, 2002).

However, from Table 4.14, the pattern of descriptive statistic results for ERV and FR are different. The mean values are lower than their standard deviation values. This occurrence can be explained by their maximum and minimum values. The gap between the maximum and minimum FR and ERV volatility is not so wide like the former which make them easily exposed to volatility.

4.4.2 Correlation Analysis

The results of correlation test between dependent variable and independent variables is very necessary in pre-estimation analysis especially as regards potential relationship suggested by theories. Before an econometric analysis therefore, it is pertinent to conduct the statistical correlation test of the variables. This will assist in determining the statistical relationship that exist among the variables under study.

Table 4.15
Correlation Matrix

Correlation	*CI*	*ERV*	*FR*	*GDP*	*TOP*
CI	1.00 -				
ERV	0.071 (0.042)	1.000 -			
FR	0.864 (0.000)	0.007 (0.009)	1.000 -		
GDP	0.368 (0.000)	-0.180 (0.052)	0.319 (0.000)	1.000 -	
TOP	-0.158 (0.000)	-0.065 (0.048)	0.158 (0.000)	0.104 (0.001)	1.000 -

Note: Figures in parentheses are probability values (*p*-values).

The correlation coefficient as calculated for the variables indicate a relatively strong relationship between the depending variable CI and the independent variables as depicted in Table 4.15. From the table, it can be concluded that, the correlation among the

variables of interest is relatively high, such as the relationship between CI and variables like ERV. The relationship correlation among the variables falls below five percent level of significance.

4.4.3 Unit Root Test

The unit root test or stationary test is necessary to validate statistical test such as *t*-statistic and *F*-statistic. Furthermore, the stationary test aids in identifying the order of integration of the variables under study. Detailed as in Section 3.6.1 of Chapter 3. Table 4.16 presents the ADF stationarity test result.

Table 4.16
Stationarity Test Result

Variables	Intercept		Intercept and Trend		Without Trend and Intercept	
	Level	First Diff	Level	First Diff	Level	First Diff
CL	-0.91	-3.46*	-2.37	-3.46*	-1.06	-7.13*
ERV	-2.82	-3.31*	-2.83	-3.28*	-2.14	-6.18*
GDP	-6.17	-0.68*	-6.42	-0.81*	-1.53	-11.2*
FR	-2.41	-0.35*	-2.12	-0.28*	-1.66	-6.05*
TOP	-2.66	-1.93*	-3.87	-1.92*	-2.72	-6.19*

Note: * indicates significant at 10 percent level of significance.

In all the results, the null hypotheses of non-stationarity failed as all the tested variable are stationary at the first difference. The no trend and no intercept approach produced results for all the variables at the level of significance and at first difference. This result confirm that estimation conducted with these data is devoid of spuriousness (Granger & Newbold, 1974). From Table 4.17, all the variables integrate at their first difference at five percent and 10 percent level of significance, respectively.

Estimation of VAR lag length selection can be conducted and subsequently the estimation of the co-integration model accordingly. From the lag selection results in Table 4.17, lag two was selected by all the selection criterion.

Table 4.17
VECM Lag Length Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2428.931	NA	2.19e+13	40.744	47.898	47.806
1	-1476.747	1773.677	345718.0	20.779	30.860	30.217
2	-1317.237	278.359*	30905.58*	27.357*	29.365*	28.170*
3	-1291.733	41.507	38658.66	27.563	30.497	28.751

Note: * indicates lag order selected by the criterion, LR: Sequential modified LR test statistic (each test at 5 percent level of significance), FPE: Final predictor error,AIC: Akaike information criterion, SC: Schwarz information criterion and HQ: Hannan-Quinn information criterion respectively.

4.4.4 Long-run Relationship Estimation

The focus of this section is to discuss the result of estimation to ascertain the existence of long-run relationship between capital inflows and ERV. The long-run relationship estimation start with co-integration test using Johansen co-integration test.

In Table 4.18, the result of Johansen co-integration test under the assumption of linear deterministic trend is depicted. The trace test and maximum Eigen value indicate one co-integration equation that is co-integrated at five percent level of significance. From Table 4.18, the result suggest one co-integrating equation thus providing evidence of a long-run relationship between capital inflows and exchange rate volatility. This implies that there is possibility of determining a long-run relationship between CI and ERV.

Table 4.18

Co-integration Test Result for Trace and Max-Eigen Statistics

Hypothesis No. of CE(s)	Eigenvalue	Trace Statistics	Max-Eigen Statistic	5 % Critical Value	Prob**
None*	0.350	83.715	45.261	33.261	0.001
At most 1	0.169	38.453	19.483	27.584	0.378
At most 2	0.089	18.969	9.860	21.131	0.757
At most 3	0.074	9.109	8.174	14.264	0.361
At most 4	0.008	0.934	0.934	3.841	0.333

Note: * denotes rejection of the hypothesis at the five percent level of significance

This result is supported by findings of former scholars like Kyongwook, Kyuil, and Seungwon (2013) and Basant (2005) who posited that CI has a long-run relationship with ERV. In their explanation, Kyongwook, Kyuil, and Seungwon (2013) believed that via increase in internal productivity and decrease in external consumptions as a result of increase in investment, CI stabilize nation's exchange rate. They however disclosed that in the short-run, this effect might be negligible but would be strong in the long-run.

Furthermore, Table 4.19 depicts estimation results of long run relationship between CI and ERV as in Equation [19]. The result on ERV shows a negative coefficient vale of -1.049 and significant at five percent. This implies that ERV reported a negative and statistically significant relationship with CI in Nigeria. Other control variables like trade openness also has a negative coefficient value of -0.02 that is statistically significant at five percent on the depending variable. However, FR has a positive coefficient of 0.083 and statistically significant output on CI at 10 percent. Result of *GDP* with coefficient of 0.008 is positive and not statistically significant in the long-run. From this results, it can be concluded that *ERV* in the long-run in the model has a significant contribution in explaining CI in Nigeria.

Table 4.19
Long Run Relationship Estimation

Variables	Coefficient	Standard Error	*t*-statistic	Prob**
L(ERV)	-1049	0.483	-2.171	0.043*
L(FR)	0.083	0.042	1.978	0.078**
L(GDP)	0.008	0.014	0.562	0.103
L(TOP)	-0.020	0.204	-2.139	0.041*

Note: * and * denote five and 10 percent level of significance, respectively.

The findings of this study is in compromise with the basic principle of the underpinning theory of the study. As a pull and push factor, exchange rate volatility determine the degree of pull or attraction and push or repulsion by its ability to manipulation the volume of productivity in an economy. The study results have showed that in the long-run, the relationship between ERV and capital inflows remained not only negative but contributed more than it does in the short-run in the explanation of capital inflows in Nigeria. This occurrence can be as a result of ERV been responsible for a slow-down in productivity thereby weakening the contribution of GDP in the long-run. Since investors are interested in investing in an economy that fast return on their investment, Nigeria economy cannot be favourable for investment under the period under study. From this results, ERV served as a push factor to capital inflows entrance into Nigeria.

Fundamentally, an appreciated ERV decreases investments as the demand level for output fall due loss of real value of a nation's currency. Falls in investment means a shrinkage inflows of new capital. Thus, appreciation of ERV shrinks CI implies the result of this study which reported a negative relationship between ERV and CI is justified.

Empirically, this findings support previous studies submission that in a small open economies, ERV as one the macroeconomic parameters served as a push factor to capital inflows (Caballero, 2012; Fambon, 2013; Magud & Vesperoni, 2015). These scholars in their separate submissions, maintained that capital inflows cannot be stable or consistence in any country that is experiencing ERV. In his analysis of ERV and capital inflows in Cameroon, Fambon (2013) opined that all African states experiencing ERV attract less capital inflows. He emphasized that the effect or impact of ERV on capital inflows increases with time, implying that long-run effects are worst on the economy total productivity.

Furthermore, Olugbenga and Oluwole (2011) reports on exchange rate volatility and export in Nigeria gives credence to this research finding by stating clearly that in the long-run, export will decline as the volume of capital inflows decreases owing largely to the persistent ERV in Nigeria. This implies that exchange rate influences the rate of capital inflows into the country. Fundamentally, an appreciated ERV decreases investments as the demand level for output fall due loss of real value of a nation's currency. Falls in investment means a shrinkage inflows of new capital. Thus, appreciation of ERV shrinks CI implies the result of this study which reported a negative relationship between ERV and CI is justified.

In addition, more empirical evidence from previous studies also agreed with this finding. Kyongwook, Kyuil, and Seungwon (2013) submitted their findings that opined that appreciation of ERV slow down productivity of an economy. Previous work by Basant

(2005) opined that the disequilibrium in the dynamics of ERV in explaining the innovations of CI can be understand more in the long-run. He maintained that in the long-run aggregate consumptions will slow forcing investment to go down. This phenomenon create hostile environment for foreign investment as output remained unconsumed. He emphasized no investor can invest when there is no market for the output thus shrinking CI as evidence in many small open economy.

In their own contribution, Tomlin (2014) and Caglayan and Demir (2014) in their individual submission, reiterated that nominal increase in the cost of production frustrate investment in any economy that is faced with ERV. Tomlin (2014) believed that in a small open economy, fluctuations in the real exchange rate can affect plant turnover, and thus aggregate productivity, by altering the makeup of plants that populate the market. He submitted this occurrence often if not in all case frustrate CI in many small open economy of the world in the long-run. In their own contribution, Caglayan and Demir (2014) argued that sources of finances are always slim in the presence of an appreciate ERV; thus, in the long-run drought of CI is always experienced by countries that suffered from an appreciation of ERV. However, they submit that the impact becomes more pronounced in the long-run but varies among countries.

4.4.5 Short-Run Relationship Estimation

The VECM test was conducted on the variable in Equation [19] to further confirm the existence of a short-run relationship between CI and ERV. From ECT_{t-1} in Table 4.20, it is clear that about 20 percent of the disequilibrium that takes place in the model will be adjusted in the subsequent year. The result of ECT_{t-1} shows a negative coefficient of -

0.196 which statistically significant at five percent. This implies that the disequilibrium has the tendency of adjustment in the long-run.

Table 4.20
Short Run Relationship Estimation

Variables	Coefficient	Standard error	*t*-statistic	Prob**
DLOGCI(-1))	0.436	0.116	3.758	0.032*
DERV(-1)	-0.018	0.009	-2.000	0.065**
DFR(-1)	0.000	0.027	0.033	0.107
DGDP(-1)	0.011	0.041	0.276	0.272
DTOP(-1)	-0.531	0.204	-2.602	0.052**
ECT_{t-1}	-0.196	0.062	-3.142	0.027*

Note: * and * denote five and 10 percent level of significance, respectively.

The results showed that after the restrictions of the co-integrating equations placed on the estimation, to correct the error that might occurred in the equation estimating procedure, it was observed that CI is negatively and significantly influenced by ERV of the last year. ERV has a negative coefficient value of -0.018 which is statistically significant at 10 percent. This implies that ERV has a negative and statistically significant relationship in the short-run with CI. The coefficient of adjustment mechanism between the variables very slow at six percent in the short-run but has the potential for a build-up in the long-run. This result confirmed the result of co-integration test earlier conducted in the estimation process.

The report in Table 4.20 is supported by findings of earlier researchers like Edward and Rigobon, (2005) and Hegerty (2009) submitted that ERV is negatively related to capital inflows. In their study, Edward and Rigobon, (2005) believed that external vulnerability generated by the presence of ERV creates an unattractive environment for capital inflows into many small open economies in the short-run. In corroboration this position, Hegerty

(2009), opined that ERV increases market pressure. This in turns reduce output with ultimately reduced investors' interest. As investors get disinterested in an economy, the inflows of capital falls in the short and medium terms.

In their own contribution, Cecen and Xiao (2012) maintained that current account dynamics of countries is an important factor that determine capital inflows. In their analysis of Turkey's economy, they emphasized that ERV distort current account balance and invariably discourage inflows of capital into Turkey in the short-run. In an earlier work by Basant (2005), he argued that exchange rate discourage inflows of foreign capital to developing economies in the short-run.

However, submissions by Gianluca, Nathan, and Luca (2015) and Ikechi (2015) posited that ERV is negatively related to CI but the relationship is statistically significant. They argued that ERV does not directly influenced rate of CI but through some medium like volume of productivity which is also influenced by other variables. Similarly, Kodongo and Ojah (2013) reported a negative but not significant relationship between ERV and CI. In their study of some SSA countries, submitted that both ERV and CI are distorted by other explanatory variables.

4.4.6 Impulse Response Function

Figure 4 shows the impulse response function of CI and the estimated variables. Figure 4.4 (a) shows that change in CI by one standard deviation lead to a positive impact of 2.5 percent up to the end of the third period when the impact becomes relatively stable. An increase in inflows of capital maintained a positive shock contribution to CI. In Figure

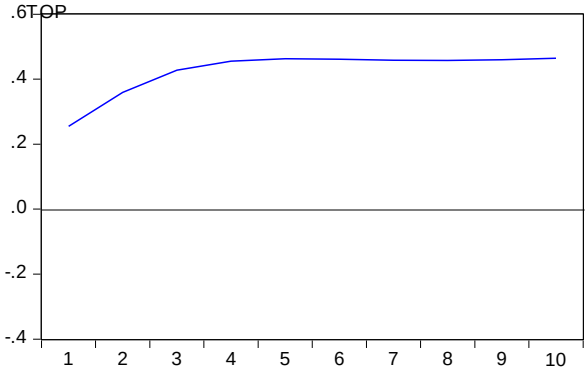
4(b), the represent a response to a one standard deviation innovation in ERV resulting into a negative response from CI.

The lowest point of negative response was in the first one and a half years after which it change in fast increase order of negativity rate. This negative innovation continue till the results of the last year of the estimation. The results show that the response of ERV on CI become more pronounced in the long-run. Empirically findings like Orji, Uche, and Ilori (2014) and Sabastian and Roberto (2009) have earlier submitted a negative statistically significant relationship between ERV and CI in both long run and short-run period. This implies that a negative relationship exist between CI and ERV in Nigeria. In other way, it means an increase in ERV leads to a decrease in CI. The result agrees with both theoretical and empirical expectations John and John (2005), Fratzscher (2011) and Kodongo and Ojah (2013) of relationship between CI and ERV volatility in Nigeria. The results of the impulse response function curve compliment the earlier results.

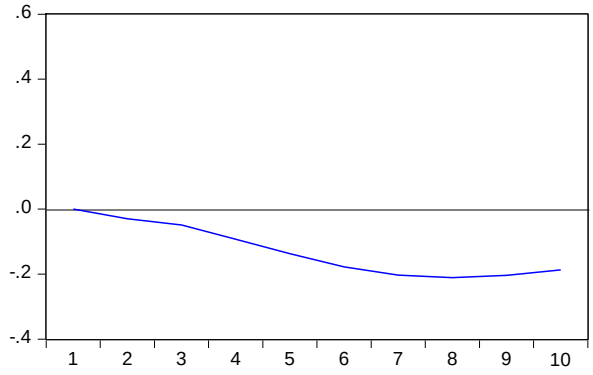
Furthermore, in Figure 4 (c), representation of successive to a one standard deviation in FR by CI. It can be traced that the response was generally positive throughout the 10 year period of observation. From the onset, the reaction was very slow but gradually pick up in the second year at a very increasing rate till the seventh year.

The response continue to be positive but at a slow pace from the eight year to the end of the period. Therefore, variable in both short and long run generate shock that influence CI in Nigeria. As in Figure 4.4 (d), GDP response on CI starts about the fourth period. The

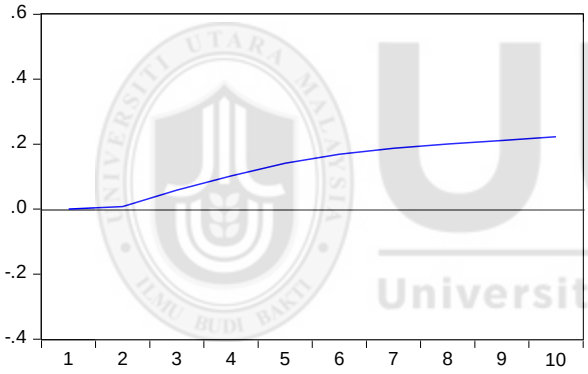
successive reaction it has to a one standard deviation on CI is positive which impact can be felt as from the fifth period. The innovation of this variable shows that it has a positive relationship with CI almost in the long run.



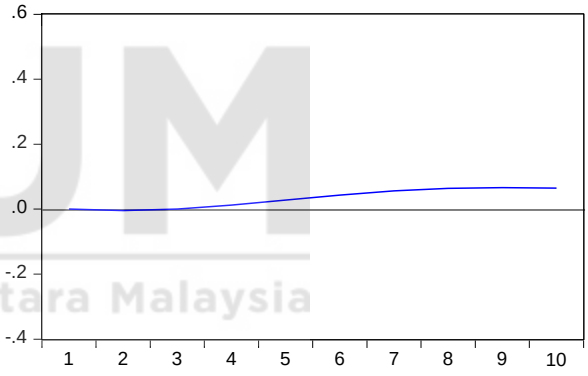
(a) Response of LOGCI to LOGCI



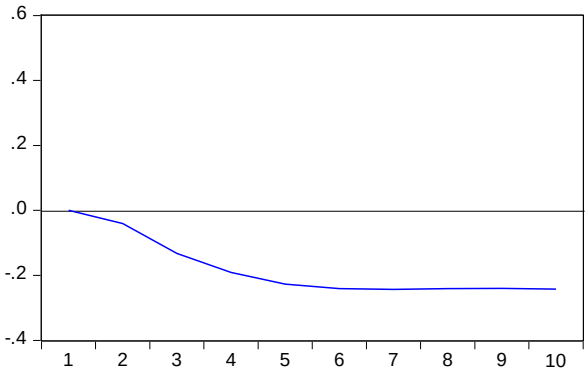
(b) Response of LOGCI to ERV



(c) Response of LOGCI to FR



(d) Response of LOGCI to LOGGDP



(e) Response of LOGCI to TOP

Figure 4.4
Response to Cholesky One S.D. Innovations ± 2 S.E.

However, as shown in Figure 4.4 (e) response to Cholesky One S.D. innovations of TOP to CI was neutral at the beginning but gradually becomes negative in the second period. The highest response was seen in the seventh period.

This result show that TOP can leads to capital flight since importation would be more encourage via unguided TOP policy. Since domestic goods and product are no longer fashionable, investors interest would diminish. The implication is that policy makers should be more proactive in the policy of TOP to avoid discouraging investor from investing in Nigeria.

4.4.7 Variance Decomposition

As earlier explained in Chapter 3, variance decomposition is targeted towards determining the relative significance of innovations or shocks in each of the independent variables in explaining variations in Nigeria CI. It depicts the result of the effect of ERV on CI. Table 4.21 shows the variance decomposition in CI while explaining the relevance of each of the independent variables contribution in influencing the dynamics of CI. Proportion of forecast error variance in CI as shown by its own innovations and the exogenous variables innovations results are shown by variance decomposition. The results on the table clearly shows that ERV, TOP, and FR factors have strong and significant influence on CI in Nigeria.

A variance decomposition for the period of 10 years was computed with the view to establish the relationship the exogenous variables with CI in Nigeria. In the first year, CI explained its own innovation. It has a commanding explanation of its own innovation for

the most of the period of the study but gradually the control weaken as the periods increases. The magnitude of influence from ERV, FR, and TOP increases as the period increases. This implies that in the long run, these variables can comfortably explain inflows of capital in Nigeria.

The combined contribution from ERV, FR, and TOP in the tenth period is more than the contribution of CI in explaining its own innovation. These three variables generate collectively 52 percent of the factors that explained CI innovation in the tenth year. Individually, ERV volatility has higher magnitude in the explanation of CI innovating factors thereby express stronger influence on CI than the two other variables.

Table 4.21
Variance Decomposition Results

Period	S.E.	CI	GDP	FR	ERV	TOP
1	6.638	100.000	0.000	0.000	0.000	0.000
2	10.775	94.921	0.035	1.012	4.017	0.014
3	13.110	87.618	0.118	2.024	6.200	2.039
4	14.145	79.870	1.218	7.057	8.800	3.059
5	14.524	72.479	1.297	10.225	10.924	5.064
6	14.691	60.801	2.339	13.528	16.261	7.062
7	14.816	54.375	2.355	14.908	19.287	9.074
8	14.920	53.500	2.367	17.277	15.750	11.105
9	14.990	52.090	2.391	18.566	14.811	12.141
10	15.035	48.848	2.450	19.750	14.784	14.166

From Table 4.21, ERV contribution in commanding the innovation of CI increase gradually till the seventh year before it starts decreasing from the eight year. As a

negative factor in the explanation if CI innovation, it increases, deplete the FR and the GDP increase. Compared to other explanatory variables, it was faster in the explanation of CI in the first seven years. The increase in the value of FR, was responsible for the reduction noticed in its contribution from the eight year.

4.4.8 Diagnostic Test

In any econometric time series analysis, results are not just endorsed but series of test have to be conducted to attest the validity of model used and the results obtained (Nelson & Plosser, 1982). In order to validate the results of co-integration estimate in Table 4.18, the LM, heteroskedasticity and stability test were conducted.

4.4.8.1 Serial Correlation

VECM LM test was also conducted on residual of VECM results obtained from the investigation. As depicted in Table 4.22, the null hypothesis failed to be rejected since the result of the LM test fulfilled the non-existence of serial correlation in the model. This furthermore validate the result obtained from the VECM estimation for testing of the objective. Both the LM probability for lag one and two where statistically insignificant of 0.974 and 0.933, respectively meaning that the study fails to reject null hypothesis. This results is agreement with previous scholar like Granger and Newbold (1974) and Hatemi-J (2008) positions.

Table 4.22
VECM LM test Results

Lags	LM-Stat	Prob
1	13.185	0.974
2	15.331	0.933

4.4.8.2 Heteroskedasticity Analysis

The heteroskedasticity test of joint cross results confirmed that the estimated VECM results obtained are statistically valid. The results of the test as depicted in Table 4.23 shows that the white noise test results is insignificant thereby confirming that the VECM results is statistically acceptable. With the probability value of 0.974 for heteroskedasticity test results, the study fails to reject null hypothesis which says there is no heteroskedasticity. Since the test results are not significant, null hypothesis failed to be rejected (White, 1980).

Table 4.23
Heteroskedasticity Test Results

χ^2	d.f	Prob
1211.034	13.185	0.974

4.4.8.3 Normality Test Results

On the VEC estimation residual, normality test is conducted to attest the normality of the model to guarantee long-run relationship among the variables estimated. Skewness, Kurtosis, and Jarque-Bera normality tests were conducted. The tests results were submitted as in Table 4.24.

From Table 4.24, the null hypothesis is rejected since the residual normality test results opined that there is the presence of normality in the model. The probability test results of all the three normality test results show a statistically significant result. These results further consolidate the co-integration result of existence of long run relationship between CI and ERV.

Table 4.24
Normality Test Results

Test	χ^2	d.f	Prob.
Skewness	390.339	5	0.000*
Kurtosis	6101.247	5	0.000*
Jarque-Bera		10	0.000*

Note: * denotes five level of significance.

4.5 Conclusion

In this chapter, discussions were made on the stated research objectives. The descriptive statistic and correlation test that was conducted on the data used for analysis and conclusions arrived at respectively. The ARCH, GARCH and EGARCH techniques and all the confirmatory test used in the estimation of objective one of the study confirm that current ERV influences its conditional volatility in the periods ahead. Also, discussion on the impact of exchange volatility and external shocks results was the ARDL technique concluded that external shock significantly impacted on ERV. Finally, reports of the investigation of the existence of a long-run relationship between ERV and CI using Johansen Co-integration technique confirmed that there is an existence of a long-run relationship between ERV and CI. The chapter come to a close with this conclusion section.

CHAPTER FIVE
CONCLUSION AND POLICY IMPLICATIONS

5.1 Introduction

This chapter marks the end of this thesis. Section 5.1 is the introduction and Section 5.2 discusses summery of findings. Section 5.3 deals with the policy implication of the study while Section 5.4 presents limitation of the study and suggestion for future study. Section 5.5 is the conclusion section of this chapter.

5.2 Summary of Findings

The adoption of SAP offered by the International Monetary Fund (IMF) by Nigeria government in 1986, marked the transition from fixed exchange rate regime to floating exchange rate regime in the country. Ever since then, the exchange rate of Nigeria currency (₦) vis-à-vis the USD has attained varying rate all through different time horizon. On this basis, this research examine the severity of current volatility in exchange rate of Nigeria ₦ vis-à-vis USD on its conditional volatility in periods ahead using quarterly data from 1986-2014. The ARCH and EGARCH were used for the analysis. The results indicated the present of overshooting volatility shock of the Nigeria Naira vis-à-vis the USD. This means that during the period under study, the Naira experience volatility. Also, the results indicated that overshooting of the Naira in the period cause more volatility in the next immediate period. This implies that current volatility of exchange rate causes its conditional volatility in the periods ahead.

Also, the research examines the impact of external shock on Nigeria's exchange rate volatility. The ARDL optimal model was used in this analysis to establish the gravity of shock, external shock impacted on exchange rate volatility in Nigeria. The co-integrating form equation of ARDL estimation was also conducted on the ARDL optimal model. As earlier stated, external shock was proxied with oil price fluctuation, political instability, and financial crisis. The results of this estimations designated that disequilibrium of 33 percent occurs in the model and will be adjusted in the subsequent year. This implies that external shock has impact on exchange rate volatility. The summary of the various proxies of external as indicated by the result, thus are; oil price increase has a negative and statistically significant impact on the innovation of exchange rate volatility dynamics during the study periods. Specifically, the results show that an increase in the price of oil at the international market, brings about a decrease or reduction in the level of exchange rate volatility in Nigeria. This negative relationship between oil price and exchange rate volatility runs in both long run and short run. Although the level of significance varies; five percent in the short run and 10 percent in the long run. This results is practically explained by the sharp rise in exchange rate volatility as a result of fall in the oil price in 2008 and 2014.

However, the summary of estimations results on political instability and financial crisis specified a positive and statistically significant impact on exchange rate volatility in both the long run and short run; thus appreciating exchange rate volatility in Nigeria in the period of analysis. In the case of political instability, the results indicated that higher political instability galvanize exchange rate volatility. This as evident in Nigeria from the

period under study, political instability is always accompanied by high level of exchange rate volatility as seen from 2013 to the end of 2014. On the other hand, financial crisis in Nigeria has tremendously encouraged exchange rate volatility. This was evident in 2004 during Nigeria stock market crashed and 2007-2008 during the global financial meltdown.

Furthermore, in this research, relationship between capital inflows and exchange rate volatility was also conducted. Johansen co-integration and VECM models were used in the analysis. The Johansen results indicated a negative and statistical significant long run relationship exist between capital inflows and exchange rate volatility; exchange rate volatility depreciate capital inflows in Nigeria. The VECM results also indicated that the relationship exist in the both short and long run for the variables.

5.3 Policy Implications

The results of the research show that exchange rate volatility is very much affected by the exchange rate volatility of the past one year. The EGARCH results shows that positive shocks will create a negative response and a negative shock creates will creates a positive response. This implies that the relationship between the current exchange rate volatility and its conditional volatility in other periods ahead in Nigeria can be ascertained. Therefore, there is need to ensure possible and sustainable positive shock which will generate a negative response on exchange rate volatility thereby reducing its effect on the Nigeria's economy. A negative response implies a decrease in in the magnitude of exchange rate volatility which means an appreciation of the country's exchange rate. Any policy towards this direction will enhance the reduction of exchange rate volatility in

Nigeria. In this regards, the research recommend monetary policies like regulating the flexible exchange rate should be encouraged by the apex bank to avoid free for all volatility. The entrenchment of rules and regulations that will encourage prudent release of foreign currency and accountable and transparent transaction with foreign currencies by commercial banks and other financial institutes. The present Naira-Yuan swap policy is a welcome idea. This policy reduces the pressure on the country's current exchange rate volatility. In addition, government should not over depend on the use of monetary policy alone but should embark on the use of fiscal policy deregulating the downstream sector of the oil industry to encourage competition by more participation.

In addition to stabilize the naira exchange rate using monetary policies, the research findings equally recommend some fiscal policies like, increased non-oil export receipts. The exchange rate volatility cannot be stable through exchange rate management alone but could be achieved through increased non-oil export receipts, especially of the basket of currencies – USD, British Pound sterling, German Dutche mark, Swiss Francs, French Francs, Japanese Yen and Dutch Guil der. The government external sector policy should focus on policies that will ensure foreign exchange earnings so that demand pressure on foreign exchange will be matched with supply. The increase in foreign exchange earnings through increase in non-oil export will ensure increased foreign reserves, improve the credit worthiness and competitiveness of the economy. It will equally strengthen the Naira and move the Naira towards equal convertibility to USD. In addition, stringent measure should be put in place to discourage importation of not too important commodities like toothpicks and also commodities that are produced in the country like

rice, chicken and cement. This will decrease the pressure on the demand for foreign currency and thereby depreciating current exchange rate volatility.

The ARDL results equally indicates that oil price, financial crisis, and political instability significantly influenced exchange rate volatility in Nigeria. Oil price negatively influenced exchange rate volatility while financial crisis and political instability positively influenced exchange rate volatility negatively. This goes to show that frequent and unpredictable increase in oil price produces a decrease in exchange rate volatility. This calls for a stable positive increase in the international oil price. Policies that guaranteed this outcome should be encouraged. Although, this might be a tall order, policies like lobbying member of Organization of Petroleum Exporting Countries (OPEC) to always respect their quota rule; thus producing with the respective quota limit. With this understanding supply will be stable and price can be maintained if not increased. Also, Nigeria government should expands her market horizon by having more bilateral relationship trade agreements with more countries that can buy her crude not just relying on USA as her major importer of the crude. Countries like China, is good to have such partner with. Also recommended is that efficient and reliable data based should be put in place to ascertained that exact proceed of oil sale is recorded or documented. This can help in proactive approach in advent of slut to avert the full wrath.

Similarly, existing refinery should be refurbished and new ones constructed. This approach would act as palliative measure if the external demand for the crude falls, Nigeria can start exporting refined crude to her neighbouring West Africa countries.

Also, government should enter into negotiation with the oil companies to reduce their retaining capacity of foreign exchange and encourage them to reinvest in the country. This could be done through certain encouraging concessions to such reinvestments. Reinvestment in area like the development of the natural gas arm of the crude oil to meet the international standard. With the development of this appendage of Nigeria crude oil, proceeds from it can help alleviated the impact of oil price on exchange rate volatility in Nigeria. This type of agreement can be achieved with an enabling legal framework and political will of the government.

Furthermore, real diversification of the Nigeria economy and making it less dependent on oil will cushion the effects of oil price falls on her exchange rate. Agricultural sector if well developed and fine-tuned to concentrate on export oriented production, can generate size able revenue that will weaken the effect of oil price on exchange rate. In addition, government should encourage small and medium scale enterprises specialized in the production of import substitution goods to avoid their importations.

However, the result on political instability submitted a positive relationship with exchange rate volatility. This implies that policies that will discourage the case of political instability or minimize it occurrence in Nigeria have to be put in place. The research recommended above all the proactive approach by the government in averting its occurrence as the best method of discouraging its existence. To be proactive, the research recommend the government to have a database that analysis the various fabric of the Nigeria society. Analysis of unemployment so that case of unemployment can be handle

before it goes out of proportion. Therefore, the research recommend government should embark on policies that will encourage the development of small and medium scale businesses to help in alleviating horrendous case of poverty and chronic unemployment. Similarly, government at all level, should provide good and affordable educational system to avoid open discrimination that can generate uprising in the state. Government should embark on policies that can make basic necessities of life affordable if not for all like the constructions of affordable housing unit that can be on owner occupier basis. Also, medical accessibility should be fairly affordable to all.

Furthermore, security operative should be well equipped and well remunerated to boost their morale in fighting crime in the country. They should be exposed to proper and regular training to increase their efficiency in delivering their duties. Closely related is encouragement of community and clan policing by the government so that criminal intention can be reported before their implemented. When everybody is policing everybody, it becomes hard for evil perpetrators to have their ways. Also recommended is the registration of all religious association under the umbrella of the two officially recognized religion in Nigeria. The two main bodies would be in the know of all groups under their units operations. By doing this, their actions and operation can be monitored and controlled. Preaching and utterance that is inimical to peaceful coexistence of the state can be nibbled in the bud.

Finally, on the case of political instability, the research recommend that electoral process should be free, fair and transparent. Leadership should be peoples' choice but not

imposition. Grievance of electoral process should be strictly adherent to the rule of law so that victory of electoral process should be the peoples' victory. Political office holder should as when due explained in their various town hall meeting their achievement so far and their intended in periods ahead. This will give room for transparency and trust.

Like political instability, financial crisis is also, positively related to exchange rate volatility. From the results, the affirmation is that as the level of financial crisis increases, exchange rate becomes more volatile. The research among other things recommended that government should put in place policies that can guaranteed transparent, effective and efficient operation in the financial sector. Like in any other dealings, accurate and reliable database is needed by the government. This would encourage a proactive response to cope with the shock of financial crisis. Nigeria government should put in place proactive measure of sovereign wealth funds during good financial period to be used during period of financial crisis. Also, monetary policy should be flexible to react in time to financial crisis as a delay will exacerbate the impact. This is by adjusting the monetary rule for on time efficiency and practical reliability. Issuing of government bonds should be when necessary and not to generate money for white elephant projects.

Also, activities of corrupt civil and public servant needs to be checked by legislative processes. Punishment should be meted out on them as deterrent for others. Closing related is blocking of leakages deliberately created by criminal draining the country resources. Policies like Single Treasury Accounts (TSA) and the use of Biometric Verification Number (BVN) in the payment of all government financial transactions would curb the leakages in the cost of governance in Nigeria.

Finally, the co-integration results shows that there is a long-run relationship between capital inflow and exchange rate volatility. The relationship is negative and statistical significant in the long run and short run. This implies that an increase in capital inflows leads to a decrease in exchange rate volatility in Nigeria. This results relate that policies that would encourage inflows of capital need to be encouraged. Legal framework that will encourage easy, assessable and harmless capital inflow policies should be enacted. Since capital inflow when judiciously used led to increase in productivity, data on capital inflows should be generate and those that are for productive purpose be monitor and supported judicious implementation.

Inflows capital investments should be encouraged to invest in production of export goods and import substitute goods. For investment in export goods, government can achieved these by creating an enabling domestic market for the sale of their produce and an export promotion council to facilitate the operation of investment in export goods. Free export zones should also be established to discourage avalanche of bottle neck faced by exporters at point of exports. Also, government should put in place a conducive legislative framework and security backup to guranteed the safety of invested fund and human capital inflows.

Government needs to integrate host communities in the acceptability of the foreign investment and awareness of what they would stand to gain. These awareness should be an explanation to them on the vision and mission of the investment in a very transparent manner to avoid backlash on the investors by their host communities. In addition,

government should development some basic structures that will make doing business in the country attractive; like the transportation and communication network, water, and power supply.

Finally, to encourage capital inflows, the study advised that the tax system should be encouraging and enticing. Multiple taxation system that presently shrouded Nigeria business climate is very frustrating for it increase the cost of doing business for foreign investors. The various level of governments in Nigeria should harmonize their tax system to encourage and attract more capital inflows.

5.4 Limitation and Suggestion for Further Research

This study uses time-series data to examine relationship between current exchange rate volatility and its conditional volatility in the periods ahead. Also, the impact of external shocks on exchange rate volatility in Nigeria was investigated. The study also, scrutinized the relationship between capital inflows and exchange rate volatility in Nigeria. The success of all analysis in econometric relies eventually on appropriate data accessibility. The research utilizes secondary data from various sources. The quality and data accessible has limited the result of this study. The chosen period was due to published data being available for all variables involved in the model across the entire period chosen for this analysis. Some important variables are either missing or limited as a result of which sources are used jointly. These limitations arise from the difficulty of finding consistent data that is reported by several institutions. Although, data from a single institution at times provide different figure for the same year. In this regard, future researchers in this area of study should improve on the quality of data to be used.

5.5 Conclusion

This section is the conclusion part of the chapter. In this section summery of research findings on three objectives of the study were discussed. Policy implications of the research findings based on the three objectives of the study were also discussed in this chapter. Limitation and suggestion for further study equally gained attention in this chapter. The chapter comes to a close with this section which is the conclusion section.

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