IMPACT OF EXCHANGE RATE MISALIGNMENT ON MACROECONOMIC VARIABLES IN NIGERIA

BY

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DECLARATION

I declare that This thesis titled "Impact of Exchange Rate Misalignment on Macroeconomic Variables in Nigeria" is a product of my research effort conducted in the Department of Economics under the supervision of Professor Mike Kwanashie, Dr. M. M Usman, and Dr. Jibril Mohammed. The information sourced from the literature has been duly acknowledged in the reference section. There has been no prior presentation of any portion of this dissertation for another Degree at any institution. I take the sole responsibility for all errors contained therein.

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CERTIFICATION

This is to certify that this thesis is an original work written by KEKERE, Sule Ibrahim (PhD/Soc-Sci/3012/2009-10) and has been examined and approved as meeting the requirement of the Department of Economics, Faculty of Social Sciences, Ahmadu Bello University, Zaria, for the award of the degree of Doctor of Philosophy (PhD) in Economics and was carried out under our supervision.

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DEDICATION

This work is dedicated to Almighty Allah (SWT) who has made it possible for me to reach this stage of my career

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ABSTRACT

Since real exchange rate links domestic economy with the rest of the world, the determination of Equilibrium Exchange Rate is pivotal to ensuring macroeconomic stability, current account sustainability and effectiveness of monetary policy through implementation of policies to mitigate the impact of exchange rate shock. Based on this, a well-known view in international macroeconomics states that a misaligned exchange rate provokes costs to the domestic economy: an overvalued currency may cause loss of competitiveness in international trade, while an undervalued currency for an import dependent country like Nigeria may cause inflationary pressures there by hurting economic growth. This provides the premise to estimate the equilibrium exchange rate (as well as its misalignment) and its ensuing relationship to some macroeconomic variables. Therefore, the key objectives of this study are to interrogate the extent of exchange rate misalignment and the effect of such misalignment on Non-oil export, growth and current account imbalance. This study utilized four competing approaches namely, Fundamental Equilibrium Exchange Rate (FEER), Behavioural Equilibrium Exchange Rate (BEER), the Natural Equilibrium Exchange Rate (NATREX) approach and the Structural Vector Auto Regression approach (SVAR).The model selection criterion which has the least Root Mean Square Error (RMSE) and Mean Absolute Error (MAE) indicated that SVAR model is selected to achieve the objective of the study. The major findings of the study are as follows; the real effective exchange rate is misaligned from the four models estimated, based on the SVAR approach selected for this study, the result indicates about 47 episodes of misalignment. The result also indicates a negative relationship between REER misalignment and Non-oil export which implies that real overvaluation could adversely affect a country's Non-oil export performance via loss in competitiveness, while undervaluation is found to support Non-oil export. On the growth regression, the result indicates that exchange rate misalignment negatively affect growth. Also, overvaluation is found to affect growth negatively while undervaluation is found to have positive effect on growth. In both specifications (growth and non-oil export), flexible exchange rate is found to have disruptive effect compared to fixed exchange rate regime due to adjustment cost. The result also shows that there is causality running from exchange rate misalignment to current account imbalance. The policy recommendation that stems from this work is that policy makers should avoid periods of long lasting appreciation as it is inimical to growth rate of GDP, Non-oil export performance and could have disruptive effect on current account.

CHAPTER ONE
GENERAL INTRODUCTION

1.1Background to the Study

Tracking exchange rate fluctuations has been an ongoing policy issue in Nigeria. This is evident through the adoption of various exchange rate regimes. From a fixed exchange rate regime in the 1960s Nigeria switched to a pegged arrangement between 1970s and the mid-1980s, and subsequently to various types of floating regimes since 1986 following the adoption of the structural adjustment programme (SAP). In the 1970s, the issue of naira exchange rate misalignment was never a concern to policy makers. The overvaluation of the naira in-so-far as it attracted attention was looked upon as an academic issue (Bogunjoko, 1992). This is because the 1970s was characterized by rising fortune in the country's foreign exchange reserve underpinned by positive development in the international oil market. The structural weakness of the economy became evident following the crash in the international oil market in the early 1980's, as a result; the question of exchange rate misalignment became a policy problem. In other words, the rising fortune of the 70s led to the negligence of policy response to exchange rate misalignment. The problem of exchange rate overvaluation and external imbalance was traced to the fact that government had maintained a relatively constant nominal exchange rate in light of the changing fortunes of the internal and external economic condition (Mawuli, 1986; Oshikoya, 1990).

The trends of the average annual growth rate of real effective exchange rate (REER), ratio of current account to GDP (CAGDP), non-oil export as a percentage of GDP (NOIL) and growth rate of GDP in Nigeria showed some remarkable pattern. For instance, from the period 1982-1986, the average percentage change of REER, NOIL, CAGDP and GDP were 0.66, 0.29, -2.39 and 0.70 respectively. As the REER depreciated to 20.21 from 1987-1991, non-oil export increase

marginally by 0.67 percent, CAGDP moved from deficit to surplus (3.64) while the average growth rate of GDP increased to 5.08 percent. Similar trend continued subsequently, when the REER appreciated to 17.22 percent from 1992-1996, the GAGDP although still in surplus fell to 0.38 percent, similarly NOILX fell from 0.96 to 0.54 percent while growth rate of GDP fell to 2.25 percent within the period. Although, the trend reversed as REER appreciated from (-1.97) between 1997 and 2001 to 3.62 percent from 2002-2006 average annual growth rate of GDP grew from 3.30 percent to 6.66 percent current account surplus widen as well from 2.62percent to 16.48 percent possibly due to improvement in the international oil price or some other factors. When the REER depreciated slightly from its previous level to 2.49 percent between 2007 and 2011 NOILX increased slightly to 1.94 while current account surplus declined 9.92 percent of GDP while the growth rate of GDP increased to 6.96 percent. Further appreciation of the REER to 5.20 percent from 2012-2014 NOILX increased to 2.40 percent while growth rate fell to 1.41 current account surplus fell to 4.77 percent of GDP.

The dynamics of these macroeconomic variables may be explained by movement in the real effective exchange rate or its misalignment. For instance, following the seminal work of Edwards (1988) that found a significant negative relationship between economic growth and overvaluation, a number of studies have attempted to test the relationship between exchange rate misalignment and economic performance. Sustained overvaluation has been linked to lower long-run economic growth (Ndhlela, 2012: Schröder, 2013; Musyoki, Ganesh, and Moses, 2014: Grekou, 2015; Missio, Jr, Britto, and Oreiro, 2015). On the opposite, in case of real exchange rate undervaluation, competitiveness is reinforced, which stimulates investment and exports, for instance, Altingo-ego and Sebudde (2004) found that causality runs from non-traditional export to overvaluation. In addition, other studies like (Jongwanich, 2009; Freund and Pierola, 2012; Ebaidalla, 2014: Sekkat,

2016) have shown that real exchange rate misalignment could impact on export and export diversification.

Most empirical research in Nigeria found significant impact of exchange rate misalignment on some macroeconomic variable. These include growth (Ali, Ajibola, Omotosho, Adetoba and Adeleke, (2015) found that a unit increase in misalignment would lead to a reduction in output by about 0.003. Also, Ibrahim (2016b) used the BEER framework to estimate the real exchange rate misalignment; the GMM estimate reveals that real exchange rate misalignment has negative but significant impact on economic growth over the period under consideration). Currency crisis (Omotosho, 2015), Non-oil export (Soludo and Adenikinju, 1997; Ogun, 1998), Capital flows (Ibrahim, 2013a), Balance of payment (David and Ojeba, 2013) and Stock market (Nwokoye, Zuberu and Ayuba, 2015). Although these studies looked at some macroeconomic-misalignment nexus, they do not look at the separate effect of overvaluation/undervaluation, also, they fail to account for possible effect of regime shift.

In recent years a number of studies have address the concept of long run or equilibrium exchange rate from very different approaches, from the most popular concept of Purchasing Power Parity theory (PPP) which implies a constant equilibrium exchange rate, to other sophisticated concepts of Behavioral Equilibrium Exchange Rate approach (BEER) and Fundamental Equilibrium Exchange Rate approach (FEER) or Macroeconomic Balance approach which build on the concept of structural equilibrium and require prior estimation of structural models (Alberola and Lopez, 1999). Interestingly, empirical evidence from Nigeria showed varying degree of exchange rate misalignment, among these studies is Aliyu (2011), who found evidence of undervaluation between 2003Q3 and 2004Q4 and overvaluation in 2005Q1 and 2006Q4 with average misalignment lying between -1.64 and -14.9, on another plane, Agu (2002) reported a marginal

degree of misalignment of 1.4% between 1970 and 1998 in Nigeria. In another study, Omotosho and Wambai (2005) used two approaches and arrived at an average misalignment of between 2.8% and 5.2% using fundamental equilibrium exchange rate approach and a misalignment of between 35.6% and 42.2% using the purchasing power parity approach. This suggest that there are methodological and empirical difficulties involved in establishing the equilibrium real exchange rate for a currency and/or estimating the deviation of the actual real exchange rate from its equilibrium level, as such, there is significant uncertainty about the path of the underlying equilibrium REERs and the degree of exchange rate misalignment. These relate to a number of factors, such as the potential instability of the underlying macroeconomic links, differences in these links across countries, significant measurement problems for some variables, including the choice of a model to describe the behavior, the time frame of the analysis, the actual estimation method as well as the imperfect "fit" of the models. Some of these problems may be more severe in developing countries like Nigeria due to data limitation which has led to the use of proxies for some variables of interest. All these problems underscore the need for robustness analysis in exchange rate modeling. The entry point of this work is to contribute to the systematic evaluation of the equilibrium exchange rate of the naira. In doing so, our framework allow us to reconcile different approaches by utilizing four measures of equilibrium exchange rate which includes; FEER, BEER, NATREX and SVAR approaches, the robustness test used for model selection is the forecast evaluation, in which case we used the Root Mean Square Error (RMSE) and mean absolute error (MAE).

1.2 Problem Statement

The desire to reduce exchange rate misalignment by policy makers provide some operational challenges one of which stems from the assumption that equilibrium real exchange rate could be estimated with respect to detecting excessive movement in exchange rate which manifest in form of misalignment (overvaluation or undervaluation). A number of researchers have argued that a stable real exchange rate relative to an equilibrium are crucial not only for improving economic performance and international competitiveness but impact on resource allocation among different sectors of the economy, foreign trade flows and balance of payments, export growth, employment and private investment, structure of production and consumption (Edwards, 1989: 1988; Aron et al., 1997; Serven and Salimano, 1991; Burda and Wyplose, 1997; Takaendesa et al, 2005).

However, estimating the degree of exchange rate misalignment remains one of the most challenging empirical problems in open economy. The fundamental difficulty in the measurement of exchange rate misalignment is that the equilibrium value of the real exchange rate is not observable. Theory tells us that equilibrium real exchange rate is a function of observable macroeconomic variables, and that the actual real exchange rate approach equilibrium rate over time (Bafes, Elbadawi and O'Connell, 1999). As a result one of the most significant challenges faced by policy makers is to ensure that the real exchange rate is at its "equilibrium level". This is because large and persistent misalignments can have significant negative economic impacts, including an eventual currency crisis (Frankel and Rose, 1996 and Kaminsky and Reinhart, 1999). The working hypothesis in the literature is that real exchange rate should be stable over time, and a simple measure of disequilibrium would then be to compare the current rate of REER to its average over a long, presumably normal period of time.

The Real Effective Exchange Rate (REER) ended in 2014 significantly below its level at the start of the review period in 1981. It appreciated steadily from 1981 and reached 546.32 (38.66%) in 1984. Subsequently, the Real Effective Exchange Rate depreciated from 490.41 (-10.23%) in 1985 to 85.17 (-68.09%) in 1987 and appreciated again to 85.57 (0.47%) in 1988. The Real Effective Exchange Rate depreciated in 1989 from 76.18 (-10.97%) to 49.73 (-17.04%) in 1992, it later appreciated from 54.50 (9.59%) in 1993 to 272.37 (15.44%) in 1998. The remaining periods were characterized by few periods of depreciation, with more episodes of appreciation (WEO, 2015).

The relative movement of REER and current account as a ratio of GDP shows that current account as a percentage of GDP was in deficit to an average of 2.79% from 1981-1984; this period also corresponds to an appreciation of the REER that rose steadily from 2.80% in 1982 to 38.66% in 1984. Generally it can be observed that the trend followed a pattern that could be adjudged to show the influence of movement in real effective exchange rate on current account to GDP ratio, this movement in CAGD could pre-empt the effect of exchange rate misalignment.

In summary, the dynamics of Real Effective Exchange Rate in Nigeria in relation to some selected macroeconomic variables showed some clear signs of unstable trajectory. The pertinent questions now are, does this movement represent misalignment of the real exchange rate? In other words, is the real exchange rate misaligned? What is the implication of misalignment on key macroeconomic variables? How does change in the institutional arrangement (government policy) change the outcome?

1.3 Objectives of the Study

The overall objective of this work is to empirically assessthe impact of exchange rate misalignment on key macroeconomic indicators in Nigeria between 1981Q1 and 2014Q4. The specific objectives are to;

i. Estimate various measures of equilibrium exchange rate in Nigeria
ii. Estimate the degree of exchange rate misalignment.
iii. Assess the impact of exchange rate misalignment on non-oil exports, economic growth and current account.
iv. Assess the separate effect of overvaluation/undervaluation as well as exchange rate regime (fixed/flexible regime) on non-oil export and economic growth.

1.4 Research Hypothesis

The following hypothesis which is derived directly from the objectives of the study will be examined. The null hypotheses are stated as;

i. $H_0 : \beta \neq 0$: The real exchange rate does not deviate from its equilibrium path
ii. $H_0 : \beta \neq 0$: There is no significant impact of real exchange rate misalignment on economic growth, non-oil export and current account imbalance.
iii. $H_0 : \beta \neq 0$: Exchange rate regime (fixed/flexible) and misalignment (overvaluation/undervaluation) on non-oil export and economic growth.

1.5 Significance of the Study

The significant nature of real exchange rate as a key relative price in international economics cannot be overemphasized. Real exchange rate guides resource allocation, directly affect a country's welfare and standard of living, and is often used as a gauge for international

competitiveness. Maintaining the real exchange rate at its "appropriate level" has helped developing countries to be more successful in general (Edwards, 1988). A real exchange rate appreciation reflects an increase in the domestic cost of production and hence a decline in the country's international competitiveness and vice versa. A number of researchers have argued that real exchange rates are crucial not only for attaining sustained general economic performance and international competitiveness, but have a strong impact on resource allocation amongst different sectors of the economy, Therefore insight into the behavior of equilibrium real exchange rate and its deviation from the path is important because of the significant role the play in macroeconomic stability and economic growth.

Empirical estimates of equilibrium exchange rates are frequently cited not only by academics but also in policy-related discussions of the by policy institutions. Such estimates are found to be useful for various closely related reasons: firstly, it helps to know where current exchange rates stand relative to longer-term measures of equilibrium, as these may provide some information on likely future movements in exchange rates. Secondly, in the context of fixed exchange rate arrangements, in particular monetary unions, it is an important in knowing whether a particular entry rate will be costly to sustain or whether subsequent adjustment of relative inflation rates will be necessary to justify any nominal exchange rate peg. Thirdly, it helps in interpreting the dynamic nature of the economy, in other words, it is useful to know whether an observed change in the value of exchange rate is justified by perceived shocks to the macroeconomic environment Driver and Westaway (2004). Different shocks can have very different implications for the economy, especially for a small open economy like Nigeria where terms of trade effects can have significant implications for inflation outcomes. As such, knowing the most likely shock to account for observed exchange rate movements may help to determine the best policy response. Therefore, the issue of

misaligned currencies (in real terms) is important in academic and policy circles because it may reflect distortions in relative prices attributed to (unsound) domestic policies, which would allow us to understand their causes and consequences so that policymakers could attempt to implement the required adjustments.

In assessing the distance of the actual exchange rate from its equilibrium value is key to identifying potentially unsustainable external imbalances, there is no consensus on what constitutes the best empirical approach to estimating the ERER, it is useful to employ as many models as possible so as to increase the likelihood of obtaining an accurate judgment based on country specific data. As such, this study contribute to the literature by employing more recent methodology that has not been applied in Nigeria in computing exchange rate misalignment, these include; the Structural-VAR approach (SVAR), Natural Equilibrium Exchange Rate approach (NATREX), Fundamental Equilibrium Exchange Rate approach (FEER) and the Behavioral Equilibrium Exchange Rate approach (BEER). To arrive at robust conclusions, we employ four quantitative approaches to identifying the ERER based on the model selection criteria adopted for this study. Another major contribution of this study is the use of episodic approach to the data, in other words, this study classified the misalignment series into overvaluation/undervaluation and evaluate their separate effect on our variables of interest. Also, this study estimate the separate effect of exchange rate regime (fixed/flexible exchange rate regime) on exchange rate misalignment episodes.

1.6 The Scope/Limitation of the Study

The study covers the period from 1981:Q1 to 2014:Q2 to examine the impact of exchange rate misalignment on some key macroeconomic variables in Nigeria. This work is limited by the use of secondary data which may not be free from political bias. Another limitation of the study is the frequent review of data set, especially by organization like the Central Bank of Nigeria were most

recent data set are tagged as “provisional”. This has really prevented the use of current data to capture recent economic dynamics. Although these limitations may likely affect the results of the analysis, they will however not limit the relevance of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Literature Review

2.1.1 Nominal and Real Exchange Rate

Exchange rate is defined as the rate at which one currency is exchanged for another. Among other things, the exchange rate determines how much the residents of a country pay for imported goods, and services, and how much they receive as payment for exported goods, and services. It can be expressed in nominal or real terms. It is referred to as the nominal exchange rate (NER) when inflation effects are embodied in the rate, and as the real exchange rate (RER) when inflation influences have been excluded (Copeland, 1989:4, Lothian, and Taylor, 1997). In other words, nominal exchange rate is the price of one currency in terms of another, and is viewed either as, the price of a unit of foreign currency in terms of the unit of local currency or the price of local currency in terms of units of foreign currency. An appreciation or depreciation of the nominal exchange rate tells us little about the competitiveness of the currency over time. What matters in terms of understanding competitiveness is the real exchange rate.

There are two variant definitions of real exchange rate; the first is defined as the ratio of domestic price of tradable to non-tradable good within a single country (internal real exchange rate). Internal real exchange rate is an indicator of domestic resource allocation incentives for home country defined as the internal relative price incentive for producing or consuming tradable goods as opposed to non-tradable good. The most useful definition of internal real exchange rate stems from Salter-Swan framework expressed as the ratio of price of tradable to non-tradable (Takaendesa, 2006).

The second is the external real exchange rate, it is the nominal exchange rate adjusted for price level differences between countries. This has gained ground in the empirical studies of the equilibrium real exchange rate (Edward, 1994; Elbadawi, 1994). This definition is derived from the PPP theory, which compares two countries and the relative prices of basket of goods produced or consumed (Montiel, 2003). The real exchange rate in this case is stated as

$$RER^* = \frac{eP^*}{P} \quad \text{----------2.1}$$

Where P and P* represent CPI between Nigeria and a reference country e.g United States, respectively.

2.1.2 Nominal and Real Effective Exchange Rate

The nominal effective exchange rate or trade weighted nominal exchange rate of a currency is a weighted average of its exchange rate against other currencies. The NEER is a multilateral rate rather than bilateral rate and can be defined as a weighted average of a basket of currencies in a given base year while the real effective exchange rate (REER) incorporates both the NEER and the inflation differentials with the ultimate aim of deflating the exchange rate indexes by corresponding indexes of relative prices. Both the NEER and REER are multilateral meaning that, it is the exchange rate of a currency in relation to a basket of other currencies. The REER is a crucial indicator of the direction of movement of the exchange rate in terms of real appreciation or depreciation and may provide indications of the gain or in price or cost competiveness relative to the selected base periods (Hinkle and Montiel, 1999).

However, it is important to know which measure is used, is it bilateral or effective? Nominal bilateral is determined in the foreign exchange market. However, most theories of equilibrium exchange rates refer to real effective (whole economy) measures of the exchange rate, albeit using different definitions of the relevant price index. Following the work of Driver and Westaway,

(2004) Marsh and Tokarick (1994) and Chinn (2002), as well as the discussion in Benigno and Thoenissen (2002), the most commonly used definitions of the REER include measures based on: consumer price index, the price of tradable good or output price, the price of an economy's exports compared to the price of its imports, relative unit labor cost, the ratio of tradable to non-tradable prices. However, these price indexes do not give a unique equilibrium, since they move in different direction. These relative movements in different measures will shift resources between sectors as well as economies. Which of the measures is seen as being most important will depend on beliefs about the key adjustment mechanisms (Driver and Westaway, 2004).

2.1.3 Equilibrium Exchange Rate

Considerable debate exists about what the fundamental or equilibrium value of a currency is and how to define or calculate currency misalignment. This is as a result of belief that exchange rate levels can differ from its underlying "fundamental" or "equilibrium" value. Edward (1989) opines that equilibrium real exchange rate is defined as the relative price of non-traded to traded goods that is compatible with the simultaneous attainment of internal and external equilibrium. Internal equilibrium is achieved when non traded goods and labor markets clear. Edwards (1989) model, which was later revised (Edwards 1994, in Williamson, 1994: 62-68) analyses the relative importance of monetary and real variables in the process of real exchange rate determination in both the short and the long run. It was used to capture macroeconomic features of developing economies, such as the existence of exchange controls, trade barriers and a market-determined parallel exchange rate for financial transactions. It also allows both real and nominal factors to play in the short run, but in the long run only real factors (fundamentals) influence the equilibrium real exchange rate.

2.1.4 Exchange Rate Misalignment

The first measure of RER misalignment uses the predictions of the PPP theory. According to the latter, deviations of the actual RER from some base year where it is believed that the RER was in equilibrium are used to calculate the real exchange rate misalignment, Cottani et al (1990). A major weakness of the PPP measure of RER distortion is the inadequate consideration given to changes in the sustainable ERER caused by changes in economic fundamentals such as terms of trade, capital inflows and technology, and trade and macroeconomic policies (Ghura and Grennes, 1991). Hence, a second measure of RER misalignment is used which is based on a formal model of RER determination developed by Edwards (1989). An advantage of the model-based measure of misalignment is that it allows the ERER to change continuously to reflect changes in economic fundamentals and domestic macroeconomic and trade policies. The PPP and model measures of RER misalignment are conceptually distinct from each other, and they could potentially move in opposite directions on a yearly basis Edwards (1989).

According to Nelson (2013) a currency is misaligned when an actual exchange rate differs from its fundamental or equilibrium value. More specifically, below or above the equilibrium values the currency can either be said to be undervalued or overvalued. Some economists, especially with the World Bank and IMF believed that a currency is misaligned when the exchange rate set by the government, or the official rate, differs from what would be set by the market if the currency were allowed to float freely. By this reasoning, governments that take policy actions to sustain an exchange rate peg, such as intervening in currency markets, most likely have misaligned currencies. Additionally, this view suggests that floating currencies, by definition, cannot be misaligned, since their values are determined by market forces. This constitutes the basis for the Fund's decision to advice government of developing countries to liberalize their foreign exchange market following the structural problem that characterized the region in the early 80s.

However, a currency can be misaligned even in a floating exchange rate regime. This is the case if the exchange rate differs from its long-term equilibrium value, which is based on economic fundamentals and eliminates short-term factors that can cause the exchange rate to fluctuate. There is a vast literature on the determinants of real exchange rates [for example, the surveys by Froot and Rogoff (1995), Rogoff (1996), and, for developing countries, Edwards (1989), Edwards and Savastano (2000), Hinkle and Montiel (1999)]. Defining or estimating an equilibrium exchange rate is not a straightforward process and is complex. Economists disagree on the factors that determine an equilibrium exchange rate, and whether the concept is a valid one, particularly when applied to countries with floating exchange rates. Economists have developed a number of models for calculating differences between actual exchange rates and equilibrium exchange rates. One of the major problems in the empirical literature is to determine what constitute the actual departure of real effective exchange rate from its trajectory. This becomes an important issue because of identifying the right policy response to address the issue of exchange rate misalignment.

2.1.5 Economic Growth

Economic growth is an indication of society's welfare. It reflects the changes in its ability to attain any socially agreed upon set of goals, whether consumption, capital formation and improvement in general well-beingof individuals in the society (Abraham, 2011). In other words, growth can be defined as sustained increase in macroeconomic aggregates particularly real gross domestic product. According to Schumpeter (1942) economic growth is generated by the endogenous introduction of product and/or process innovations. In other words, the essential characteristic of this growth model is the incorporation of technological progress which is a result of the endogenous introduction of product and/or process innovations.

Subsequent contribution by Romer (1990) and Lucas (1988),who pioneered internal growth models incorporated R&D development into economic growth model as an endogenous variable. In these models, it is suggested that R&D investments lead to technological innovations and developments thanks to human capital and accumulation of knowledge(Cuma, 2015). Another important contribution to the new growth models is the work of Grossman and Helpman, (1989, 1990). The theoretical foundation of the work is based on technological innovation as well as associating economic growth with foreign trade and openness. In their studies, Grossman and Helpman defined three fundamental production activities within a multiple country, dynamic general equilibrium model; including that of conventional products, modern industrial products, and R&D efforts that lead to development of industrial products through generation of knowledge. Accordingly, products developed through technological advancement enable a comparative superiority in foreign trade, create an increase in global trade, and drive growth (Şahin, 2015). However, the fundamental flaw of these definitions is that they do not take into cognizance the issue of income redistribution.

A much detailed and acceptable definition of economic growth is that of Kuznets (1955) who opines that modern economic growth of nations has two distinctive features: in all cases, it involves a sustained and substantial rise in produce per capita and in almost all cases it involves a sustained and sustained rise in population. Kuznet further stressed that modern economic growth implies major structural changes and correspondingly large social and institutional conditions under which the greatly increased product per capita is attained. Yet for purposes of measurement, the changing components must be reduced to a common denominator, otherwise it would be impossible to compare the product of the United State with that of china or the product of an advanced country today with its output a century ago.

2.1.6 Non-oil Export

The high oil intensity that characterized the Nigerian economy and the instability in the international oil market has brought into focus the increasing need to diversify away from oil to non-oil export. According to Onodugo, Benjamin and Ndibe, (2015) non-oil sector comprises those groups of economic activities which are outside the petroleum and gas industry or those not directly linked to them. It consists of sectors such as manufacturing, agriculture, telecommunication, service, finance, tourism, real estate, construction and health sectors. Non-oil (mostly agricultural) products such as groundnuts, palm kernel, palm oil, cocoa, rubber, cotton, coffee, beans, hides, skin and cattle dominated Nigeria's export trade in the 1960s. However, the discovery of crude oil in commercial quantity shifted the attention from non-oil export to a "petroleum mono-cultural economy" since the 1970s. While petroleum export was growing, non-oil exports were declining, this made the dominance of oil export over non-oil export much more rapid and pervasive. For the purpose of this study non-oil exports refer to agricultures, foresting products and minerals, which includes; cocoa. Groundnut oil, palm produce (palm kernel and oil), Natural rubber, Hides and skin, Wood, Fishes, Cotton, Rubber, timber, logs, plywood, tin etc. while manufactured products such as: Textile, Chemical, Motor vehicle/machinery, Soap/detergent, Beer/Beverages, Urea, Processed skin other manufactured exports.

2.1.7 Current Account Balance

Current account balance is the measure of an economy's savings, along with net capital transfers and acquisition/disposal of non-produced, non-financial assets, the current account balance represents the net foreign investment or net lending/borrowing position of a country vis-à-vis the rest of the world. The current account balance shows a country's inflows and outflows arising from trade in goods and services, investment income from overseas assets, transfers (private and

government) between countries. As an important macroeconomic indicator, the current account balance is closely related to other important components of national savings and investment - the budget balance and private savings - and has important implications for overall economic growth, exchange rate movements, and competitiveness (Srdan, 2012).

According to Krugman, Obstfeld, and Melitz (2012) current account balance can be defined as the difference between exports and imports of goods and services. In similar way, Stutely (2010) defined current account balance as the balance of trade in goods and services plus income and current transfer payments. Fundamental national income accounting identities ensure that the current account is equal not only to the difference between exports and imports, broadly defined, but also to the difference between savings and investment (Krugman 1991). Therefore, the issue of how current account balance is achieved in practice can be viewed in terms of whether it is savings or investment that adjusts to an external imbalance.

The national account provides a useful framework for analyzing the connection between the current account balance and net capital flows and, in turn, their relationship to domestic saving and investment. In addition to conceptualizing current account balance as a savings gap – that is the differences between domestic savings and domestic investment spending. The national income accounts also revealed that a country's overseas investment is related to domestic saving and investment spending, in other words, a country invests abroad when its domestic savings are more than sufficient to finance domestic investment expenditure. Such a country sends its surplus savings abroad in the form of foreign direct investment or investment in foreign stocks, bonds, or real estate. This stream of surplus savings is referred to as a capital outflow, making the country a net lender to the world. A country that does not generate savings sufficient to finance its own investment needs must attract surplus foreign savings in the form of a capita linflow. Such a

country records negative net foreign asset purchases, or equivalently, is a net borrower from the world (Hitggins and Klitgaard, 1998).As such, the current account balance and foreign asset purchases are simply two ways of looking at the same underlying quantity of lending. According to Knight and Scacciavillani (1998) the current account of the balance of payments plays several roles in the policy makers' analysis of economic developments. Since it reflects the totality of domestic residents' transaction with foreigners in the market for current goods and services as well as the inter temporal decisions of domestic and foreign residents (with respect to savings, investment, the fiscal position and demographic factors), as such current account provide information about the actions and expectations of all market participants in an open economy.

2.2 Theoretical Literature

It is difficult for any model to describe adequately all features of modern economies that are relevant to determining exchange rate movements, especially of economies fully integrated into the international economic and financial system. Some economists argue that misalignment cannot be measured at all because empirical techniques are unable to capture the continuous evolution of structural economic relationships that drive exchange rates, while others belief otherwise. Thus, there is no “fail safe” method in estimating the proper value of an economy’s foreign exchange rate or in establishing a precise measure of over- or under-valuation. Below are review of some theoretical discuss regarding the dynamics of real exchange rate.

2.2.1 Purchasing Power Parity Theory

Purchasing power parity (PPP) is often the measure economists first turn to when asked to think about the issue of equilibrium exchange rates and exchange rate misalignment. But the implications of the so-called PPP puzzle – the combination of high real exchange rate volatility and the slow mean reversion of real exchange rates – implies that PPP on its own is unlikely to be

a useful measure of an equilibrium exchange rate. The PPP theory postulates that the exchange rate change between two currencies over any period of time is determined by the change in the two countries' relative price levels (Jongwanich, 2009). When the prices of each good, in a common currency, are equalized across countries and the same goods enter each country's market with the same weights, the equilibrium RER can be determined as follows: $RER^* = \frac{ep^*}{p}$, Where RER* is the equilibrium real exchange rate, e is the nominal exchange rate (in unit of foreign currency), P* is the foreign price, and P is the domestic price. Equation (2.1) is referred to as the absolute PPP, which relies on the assumption of the law of one price. The law of one price always implies integrated competition markets. However, the law of one price may not necessarily hold because of differences in the spot price of commodities across countries and apparent inability to shift commodities instantaneously from one location to another. A number of studies like Brunetti, Kisunko, and Weder (1997) and Tybout (2000) have argued that price control is among the regulatory problems facing production lines in less developed economies, which constitutes an impediment to the law of one price. Other studies have also found that deviations from the law of one price are significant, volatile and persistent, even across highly traded and sophisticated manufacturing goods (Rogoff, 1996). The relative PPP is introduced to take account of such defect in absolute PPP. Under the relative PPP, the equilibrium RER is as follows;

$$RER^* = \frac{ep^*}{p} = \theta \quad ----------2.2$$

Where θ is constant, mainly reflecting the obstacles to trade and the difference in (consumption) basket composition, both the absolute and relative PPP theories postulate that equilibrium RER is constant over time. However, many empirical studies cast doubt on the validity of this theory see for instance, (Frankel 1981, Adler and Lehman 1983, Krugman 1978, Obi 1987).

There are a number of potential limitations with the basic concepts of PPP in capturing sources of shocks or changes to both nominal and real equilibrium exchange rate. Some are largely due to its underlying concept and others to its basic assumption (Siregar, 2011). PPP does not capture the existence of non-tradable sector which undermines it applicability, in a study by (Egert and Lahreche-Revil (2003), the share of the non-tradable sector has been found to be significant among transition and developing economies. Supporting the finding of Egert, et al (2006), Duval (2002), examined tradable and non-tradable real exchange rate movements of 14 OECD economies and found that long-run PPP rates cannot be verified for the tradable rates. Furthermore, Duval (2002) also found that there is a very high correlation between the real exchange rate for tradables and non-tradables. The presence of non-tradable products often explains the gap between the consumer price index (CPI) and the producer price index (PPI) or the wholesale (WPI)-deflated real exchange rate (see Isard (1977), Richardson (1978) for some of these findings).

However, the debate on the validity of PPP has experienced a complete reversal in the literature during the 1990s, since its absolute rejection has been later replaced by gradual acceptance (Taylor and Taylor, 2004). In the beginning, PPP was seen as a very long-run phenomenon at best. However, calculated half-lives for deviations of exchange rates from PPP have remarkably decreased in empirical analyses, due to the application of more sophisticated methods. Estimated half-lives have decreased from five to six years (e.g Rogoff, 1996) to approximately one to two years only (e.g Coakley and Fuertes, 2000, Imbs et al., 2005). Thus, the concept of PPP has probably gained importance due to investor sentiment (Menkhoff and Rebitzky, 2007). The discussion above shows that there is problem with the PPP approach as a measure of equilibrium

exchange rate, a view supported by the proponents of PPP. Also, it is strongly argued that the rate of mean reversion is very slow[1].

2.2.2 Monetary Approach to Equilibrium Exchange Rate Determination

The monetarist approach emerged in the 1950s, first as an approach to balance of payments analysis and later refocused on exchange rates (Jimoh, 2004). The monetary model is based on three assumptions. The first assumption is that the economy is characterized by a vertical (inelastic) aggregate supply curve and the second assumption is that the economy is characterized by a stable demand for money. Finally the third assumption is that the absolute purchasing power parity (PPP) theory that prices across countries are equal holds (Mapenda, 2010). The central point of the monetary approach to balance of payments policy theory is that balance of payments deficits or surpluses reflect stock disequilibrium between demand and supply for money. In other words, balance of payment deficit or surplus represents a transient stock-adjustment process evoked by initial inequality between actual and desired money stocks. One of the major conclusions of the monetarist approach to external balance analysis is that exchange flexibility is unnecessary and that balance of payment disequilibrium can only be corrected by policies that rectify the disequilibrium in the domestic money markets.

The building blocks of the monetary approach to exchange rate determination are the purchasing power parity theory and money market equilibrium condition. The major feature can be outline as follows.

The starting point is the purchasing power parity theory which can be stated as follows

$$P = eP^* \quad \text{---------- } 2.3$$

[1]See MacDonald (2000) for details

Were P is the domestic price level, P* is the foreign price level, e is the exchange rate which is the domestic price of foreign currency. The domestic nominal money supply Ms and the real money demand Md respectively can be written as

$$Ms = M \quad \text{---------- 2.4}$$

$$Md = L(y, r, k) \quad \text{----------2.5}$$

Applying same to foreign variables gives the following relationship

$$Ms^* = M^* \quad \text{----------2.6}$$

$$Md^* = L(y^*, r^*, k^*) \quad \text{---------- 2.7}$$

Where y is the domestic real income, r is the domestic real interest rate, k=other domestic variable, L is the familiar demand function for real cash balance in the domestic economy and the stared variables are the foreign counterpart of the domestic ones. Then money market equilibrium in both domestic and foreign money market implies:

$$\frac{M}{P} = Md^* \quad \text{---------- 2.8}$$

$$\frac{M^*}{P} = Md^* \quad \text{---------- 2.9}$$

From equation 1, eqn 6 and 7 becomes

$$e = \left[{}^{M}/_{Md}\right] / [{}^{M^*}/_{Md^*} \quad \text{----------2.10}$$

$$e = \left[{}^{M}/_{M^*}\right] \left[\frac{L(y^*, r^*, k^*)}{L(y, r, k)}\right] \quad \text{----------2.11}$$

Assuming income elasticity is ‘a’ and interest rate elasticity is ‘b’ of demand for money respectively in both countries and the functional form is Cobb-Douglas (Jimoh, 2004). The final form of the monetarist approach to exchange rate determination is given as;

Equation 2.10 assume away the fulfillment of PPPT in which case

$$d_t = In\left[e_t \frac{p_t^*}{p_t}\right] = Ine_t - Inp_t + Inp_t^* = cd_t - - - - - - - - -2.12$$

The final monetary model includes short-term price rigidities, following the work of Dornbusch (1976) and Frankel (1979). With short-run price stickiness, the PPP condition is violated temporarily, and the short-term liquidity effects of monetary policy would have to be captured by a relation between interest rates and the exchange rate. To incorporate the latter relationship, Frankel (1979) used a real interest rate variable defined as nominal interest rate differential term and an inflation expectation component to give the following reduced form equation:

$$e_t = \alpha - \beta(m_t^* - m_t) - a(y_t^* - y_t) - b(r_t^* - r_t) - c(p_t^* - p_t) + \beta\pi(\pi_t^* - \pi_t) + \varepsilon_t - -2.13$$

Where$m_t$is the money supply, y is real income, r is the nominal interest rate, * denotes a foreign variable and all variables except interest rates are in natural logarithms, The monetary approach simply states that the movement of nominal exchange rate is driven by the excess money supply, output and nominal interest rate in the local economy relative to their levels in the foreign economy. Within this framework an increase in domestic interest rates will generate depreciation in the exchange rate, even though domestic assets will be more attractive. This is because an increase in interest rates reduces the demand for domestic money creating an excess supply of money. To restore money market equilibrium prices must rise, and hence for PPP to hold a depreciation is needed. By assumption the model displays neutrality to the determination of nominal magnitudes. However, the assumption that PPP holds continuously implies that this model of exchange rates cannot explain or generate changes in real exchange rates, such as might be needed if there were a sustained relative productivity shock. This is also true of the long-run behaviour of the overshooting model, which also collapses to PPP (Driver and Westerway, 2004).

2.2.3 Behavioral Equilibrium Exchange Rate (BEER)

The BEER takes as its starting point the proposition that real factors are a key explanation for the slow mean reversion to PPP observed in the data and as such offers a way of exploiting a theoretical (real) exchange rate model in order to obtain a measure of the equilibrium exchange rate and therefore, by implication, exchange rate misalignment. The BEER has the potential to capture all of the systematic and fundamental movements of exchange rates and can be subject to rigorous statistical testing, in terms of various metrics, such as the speed of mean reversion. Following Clark and MacDonald (1999), we define Z1t as a set of fundamentals which are expected to have persistent effects on the long-run real exchange rate and Z2t as a set of fundamentals which have persistent effects in the medium-run, that is over the business cycle. As we shall see below, the key term in the Z1t vector is usually taken to be net foreign assets and, perhaps also, a relative productivity term and the terms of trade, while the Z2t usually contains real interest rate yields, to capture medium run, or business cycle related influences on the real exchange rate. Given this, the actual real exchange rate may be thought of as being determined in the following way:

$$q_{t=}\beta_1 Z_{1t} + \beta_2 Z_{2t} + \tau' T_t + \varepsilon_t \text{----------2.15}$$

where T is a set of transitory, or short-run, variables and εt is a random error. Following Clark and MacDonald (1999), it is useful to distinguish between the actual value of the real exchange rate and the current equilibrium exchange rate, qt. The latter value is defined for a position where the transitory and random terms are zero:

$$q_{1t} = \beta_1 Z_{1t} + \beta_2 Z_{2t} \text{----------2.16}$$

The related current misalignment, cm, is then given as:

$$CM = q_t - q_{1t} = q_t - (\beta_1 Z_{1t} + \beta_2 Z_{2t}) \text{----------2.17}$$

Equation (2.16) can be re-written to obtain total misalignment (TM) as

$$TM = \beta_1(Z_{1t} - Z_{1t}) + \beta_2(Z_{2t} - Z_{2t}) + \tau' T_t + \varepsilon_t \text{----------2.18}$$

The calibration of the fundamentals at their desired levels may either be achieved by the user placing some judgment on what values the actual variables should have been during the sample period or, perhaps, using some sort of statistical filter, such as the Hodrick- Prescott filter, a Beveridge Nelson decomposition or a Granger-Gonzalo decomposition to produce a PEER. However, equation (2.18) indicates that the total misalignment at any point in time can be decomposed into the effect of the transitory factors, the random disturbances, and the extent to which the economic fundamentals are away from their sustainable values.

Compared to the FEER the BEER approach is not a normative one. As noted, the FEER depends on somewhat abstract and subjective notions of "sustainable external balance" and "internal balance". In contrast, equilibrium estimates under the BEER is consistent with the prevailing levels of economic fundamentals. Second, the BEER considers short-run cyclical/temporary factors that may contribute heavily to medium-to-long-run movements of ERER. In particular, the adoption of interest rate parity allows the BEER approach to capture the sources of changes in capital account which may then also affect the current account and the "behavior" of the exchange rate. In contrast, the FEER approach only captures the behavior of the exchange rate driven by changes in the positions of external and internal balances. As indicated above, the BEER is derived based on the prevailing levels of economic fundamentals. Hence, the misalignment rate (i.e. actual rate minus BEER) is often referred to as current misalignment rate. However, BEER is often criticized based on the modeling of the expectations of agents, for instance, Clark and MacDonald (1998) assume

that agents anticipate the exchange rate to reach its equilibrium value in the next period; their low empirical estimates of the error correction parameter imply that the return to equilibrium is very slow. In conclusion, since the BEER is derived based on the prevailing levels of economic fundamentals, the misalignment rate (i.e. actual rate minus BEER) is often referred to as current misalignment rate.

2.2.4 Fundamental Equilibrium Exchange Rate (FEER)

One of the most widely used concepts in determining equilibrium RER is FEER (Williamson 1994). The FEER is defined as the RER that simultaneously attains 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 characterized as a sustainable balance of payments position over the medium term, ensuring desired net flows of resources and external debt sustainability (Jongwanich, 2009). The FEER tends to abstract from the short-run cyclical and speculative forces in the foreign exchange market. The first is to identify the external balance equation by simply equating the current account balance) (CA to capital account balance) (KA) .This equation can be written as.

CA = -CAP----------2.19

To determine FEER, the current account position (CA) is first set as a function of equilibrium real exchange rate (RER*), full employment output of the local (Y d*), and foreign (Y f *) economies. However, by definition CA is the sum of the net trade balance and return of net foreign asset (nfa). The net trade balance (ntb) is assumed to be a function of full employment level of output of the local and foreign economies (ȳd, ȳf) respectively, and the real effective exchange rate (q).

$$CA = ntb + nfa \quad ---------- \quad 2.20$$

$$ntb = \beta_0 + \beta_1 q + \beta_2 \bar{Y}_d + \beta_3 \bar{Y}_f$$

Where, $\beta_1\beta_3$>0 and β_2<0

nfa = f (q)

Combining (2.19 and 2.20) the following medium term balance of payment equation can be generated

$CA = f(REER^*;\ Y_d;\ Y_f) = CAP^*$----------2.21

Given full employment outputs of the local and foreign economies, (ȳd) and (ȳf) respectively, and that of medium-term equilibrium (CAP)*, the level of real exchange rate to be derived from Equation (2.21) is the FEER. The characteristics building blocks of FEER approach is encapsulated in solving equation (2.21) to yield

$REER^* = f\left(CAP^*; \bar{Y}_d \bar{Y}_f\right) - - - - - - - - - - - - -2.22$

Equation (2.22) will ensure that we achieve a sustainable current account or the path to achieve the macroeconomic (internal and external) balance. However, the fundamental equilibrium exchange rate (FEER) is a normative measure of equilibrium RER as it involves some notion of "ideal" economic circumstances of internal and external balances. In particular, defining external balances, i.e., sustainable CA balance, tends to be controversial. In addition, to determine FEER, trade elasticity needs to be calculated to determine the response of exports and imports to relative price changes. Different forms of CA equations could lead to different values of the trade elasticity. Relying too much on trade elasticity may generate an inaccurate estimate of the FEER trajectory. Note that empirical studies that apply the FEER approach often rely on a full-blown multi country macroeconomic model to capture the linkages of key macroeconomic variables. The sustainable value of the CA balance is set exogenously (Jongwanich, 2009).

Unlike the simple PPP approach, the FEER approach recognizes that the ERER will vary across time as factors impacting sustainable internal and external balances evolve. In the case of internal balance, for instance, apart from potential output growth associated with low inflation both in domestic and foreign economies, potential differences in the productivity growth between tradables and nontradables sectors in an economy could lead to a depreciation or appreciation of the FEER. Similarly, the notion of "sustainable" current account level could change over times. By focusing on flow equilibrium concepts FEER employ economic fundamentals in reduced-form equations to arrive at the ERER, as a result estimated coefficients are thus easily interpretable from the policy lens. The FEER-MB approach also has the attractive feature that the exchange rate required across countries can be made internally consistent on a multilateral basis through normalization (Lee et al 2008). Another concern is that the calculated FEERs are often sensitive to the assumed value for the sustainable CA balance, as a result different judgments about what constitutes a sustainable CA will lead to different FEER estimates. Furthermore, trade elasticities, which are the basis for calculating real exchange rate adjustments that align the underlying and sustainable CA balances, are often sensitive to the specification of trade equations (Driver and Wren-Lewis, 1999).

2.2.5 Permanent Equilibrium Exchange Rate (PEER)

One of the major weaknesses of the BEER is that it does not distinguish between the long-term and short-term values of economic fundamentals. An extension of the BEER that is based on the consideration of the longrun "sustainable" level of economic fundamentals is called the PEER (The Permanent Equilibrium Exchange Rate) and is closely related to the BEER approach. It underscores that the total RER misalignment at any given moment (the difference between the fitted and actual value of the RER) depends on transitory (short-term) factors and on the departure

of fundamentals from their long-term value; usually, the decomposition into permanent and transitory components is obtained by using the techniques introduced by Beveridge and Nelson (1981), Clarida and Gali (1995), Stock and Watson (1998) and Gonzalo and Granger (1995) are some of the commonly used empirical tools to decompose the non-stationary series into permanent (the non-stationary part) and the temporary (stationary) component. The misalignment rate (i.e. actual rate minus PEER) is often referred to as total misalignment rate.

2.2.6 Desired Equilibrium Real Exchange Rate (DEER)

The Desired Equilibrium Real Exchange Rate (DEER): This approach is very similar and linked to the FEER approach described above; the only difference is that in the case of DEER, the situations at both internal and external fronts are defined in terms of desired policy objectives (Bayoumi et al., 1994). Thus, the DEER approach implies defining "desired" paths for policy variables instead of "sustainable" paths, as done in the FEER approach.

2.2.7 Natural Equilibrium Exchange Rate (NATREX)

"Natural Rate of exchange" or NATREX defined broadly as the rate that would prevail if speculative and cyclical factors are removed while unemployment is at its natural rate was developed by Stein (1994) in response to the underlying shortcoming of the BEER/PEER and FEER approaches because these models do not capture the nature of the convergence process from the short-run/actual rate to the equilibrium rate. Accordingly, Stein (2001) defines the NATREX-based equilibrium real exchange rate as that value of the real exchange rate that satisfies several criteria. First; it is consistent with internal balance. This is a situation where the rate of capacity utilization is at its longer run stationary mean. Second, it is consistent with external balance. The latter is a situation where, at the given exchange rate, investors are indifferent between holding domestic or foreign assets. At the equilibrium real exchange rate, there is no reason for the

exchange rate to appreciate or depreciate. Hence, portfolio balance or external balance implies that real interest rates between the two countries should converge to a stationary mean.

In this approach, (a different) ERER is defined both for the medium and long-terms; what is distinctive about the NATREX approach is that it also considers the stock of capital and of net foreign debt as part of the model and, and describes the path of the RER from the medium-term equilibrium (which is obtained based on the current values of the capital stock and foreign debt) to the long-term equilibrium (which is derived from the capital stock and foreign debt stabilized at their steady-state levels) (Stein, 1994, 1995 and 2002), Stein and Allen (1995). The starting point is captured in the following equation.

$$S(w) - I(x) = CA(q, Y) = -KA(z) \quad \text{---------- 2.24}$$

Where S denotes national savings, I denote investment spending and W, X, Y and Z are a vector of variables, q is real exchange consistent with internal balance. However, Stein (1994) excludes speculative capital flows from his measure of capital account, and the sustainable capital account term is assumed to be equal to social saving less planned investment. The key determinant of social savings is the rate of time preference, tp, while the key determinant of investment is Tobin's 'q'. The later in turn is determined by productivity, w, and the real exchange rate.

$$S(tp, nfa) - I(w, q, k) = CA(q,k,nfa) \quad \text{----------2.25}$$

Additionally, savings are assumed to be a function of net foreign assets and investment a function of the capital stock, k. The inclusion of stock in the flow relationships enable equilibrium to be derived which is stock-flow consistent. In any medium run, the desired level of savings, investment and the current account depends on the level of capital stock and net debt to foreigners given exogenous factors such as the level of productivity, the rate of time preference, the world rate of interest, the risk premium and the terms of trade Allen, (1994).

Based on the exogenous terms of trade, the equilibrium condition for the good market is the market clearing condition for the non-tradables (Lim & Stein, 1995). Market equilibrium requires that national investment, I, minus national savings, S, plus the current account, CA, sum to zero.

$$(I-S) + CA = 0 \text{ ----------} 2.26$$

Savings are equal to domestic output, Y, plus income from abroad (foreign interest times foreign assets) (r′F), less consumption, C. Domestic output is a function of capital (K) and total factor productivity (TFP). Consumption is a function of wealth (capital, K, plus foreign assets, F) and social time preference. The social time preference is modeled as an endogenous variable dependent on demographic factors and liquidity constraints both the dependency ratio of the young (DEPY) and of the old (DEPO). The latter is expected to have a positive impact on consumption given China's underdeveloped pension and medical care systems (You & Sarantis, 2012). Under an imperfect financial market, decline in liquidity constraint is an important determinant of consumption (see Yang and Li, 1997, Zhang, 1997, and Zhang and Wan, 2002). The specification for saving function is as follows;

$$S = Y(K: TFP) + r'F - C(K, F; LIQC, DEPY, DEPO)$$

$$= s(\underset{+}{K}, \underset{-}{F}; \underset{+}{TFP}, \underset{+}{r'}, \underset{+}{LIQC}, \underset{-}{DEPY}, \underset{-}{DEPO}) \text{ ----------} \mathbf{2.}27$$

Aggregate investment (I) can be decomposed into domestic private investment (DPI), government investment (GI) and foreign direct investment (FDI). Domestic private investment is a function of output (Y), user cost of capital (c), government investment (GI) (see Song et al. 2001; He and Qin. 2004). FDI is a function of relative unit labor cost (RULC), relative return to capital (RRC) and country risk (approximated by foreign assets, F) as in You & Sarantis, (2012). Aggregate investment function is stated as;

$$I = (R_n, K, F, TFP, GI, RULC, RRC, T, r, \tau) - - - - - - - - - - - - - - - - - 2.28$$

Based on the exogenous terms of trade, the equilibrium condition for the good market is the market clearing condition for the non-tradables (see Lim & Stein, 1995):

$$(I - S) + CA = 0 - 2.29$$

$$C_n(R_n, K, F: LIQC, DEPY, T) + I_n(R_n, K: TFP, r, \tau, GI, T)$$

$$= Y_n(R_n, K: TFP) - 2.30$$

With current account equals trade balance plus the interest income on foreign assets, r'F. The trade balance is the value of exported good (Y1) less the value of imported goods which consist of consumption and investment that uses imported good (C2 and I2)

$$CA = YI(R_n, K: TFP) - I2(R_n, K, F: TFP, r, GI, RULC, RRC, T)$$
$$- C2(R_n, K, F, LIQC, DEPY, DEPO, T) + r'F - - - - - - - - 2.31$$

The fundamentals that affect the relative price of non-tradables, R*n, affect the long run real exchange rate, R*, this implies that solving for the relative price of non-tradable is equivalent to deriving the long run equilibrium equation for the real exchange rate given by:

R = R*(T, TFP, LIQC, DEPY, DEPO, GI)*

$$= R^*(\underset{+}{TOT}, \underset{+}{LIQC}, \underset{-}{DEPY}, \underset{-}{DEPO}, \underset{-}{GI}) - 2.32$$

In summary the medium run equilibrium following NATREX approach assumed that prices have adjusted, output has returned to its potential level, and desired national investment equals desired national saving, which depends on the stocks of capital, wealth, and debt. However, the long run equilibrium is obtained by considering the dynamics of endogenous fluctuations in capital and foreign debt. Therefore, the accumulation of capital and external debts will directly influence investment and saving in the economy Fida, Khan and Sohail (2012). Thus, three exogenous

variables have been listed in basic NATREX model as the fundamental determinants of the movements of key variables included in the endogenous equations (namely investment, saving, flows of external debt and capital). The first one is the social thrift or time preference variable. The variable can be represented by the sum of private and government consumption. The second variable is productivity and the third variable is terms of trade.

The major advantage of these equilibrium exchange rate models over the simple PPP framework is that they all relax the assumption of static equilibrium and allow the equilibrium exchange rate to change as economic fundamentals change. One measure of exchange rate may capture movements of the exchange rate associated with shocks from the local economy, while other measurements incorporate both internal and external factors (see Table 2.1 for summary of some theoretical issues). As briefly mentioned in the introduction, depending on what policy issues or research questions we wish to address, more than one exchange rate measure may need to be calculated. Ultimately, different constructions of exchange rate measurements will likely lead to different estimates of the equilibrium rates (Sirega, 2011). As a result of these, several equilibrium measures would be applied and also we intend to use some model selection criteria to choose the model that will give an appropriate measure of misalignment for the estimate to be valid for policy making.

2.2.8 Other Models of Exchange Rate Determination

Edwards Model

Following Edwards (1988), the ERER is affected by real variables only, categorized as external and internal "fundamentals". The external fundamentals are measured by (i) the international terms of trade, and (ii) international transfers including capital and aid inflows. The domestic fundamentals include those that can be affected by policy and those that are independent of policy

decisions. The policies which can directly affect ERER include import tariffs, import quotas, and export taxes. Also, technological progress is among the most important domestic non-policy fundamentals. While these fundamentals affect the ERER, deviations of the actual RER from its equilibrium are induced by inappropriate macroeconomic policies which encourage large fiscal deficits relative to GDP and rapid growth in money stock relative to money demand to finance such deficits. Such policies are inconsistent with a policy of fixed exchange rates and cause an appreciation in the actual RER and hence raise the degree of misalignment. It has been observed that the terms of trade have accounted for wide fluctuations in the ERER in SSA. For instance, during the oil boom period, oil exporting countries such as Nigeria and Gabon experienced increasing misalignment (appreciation in their RER) since they did not take immediate steps to correct the resulting disequilibria in the fixed nominal exchange rates.

Edwards (1988) model considers a three-good – exportables, importables and nontradables – small and open economy with no price rigidities and no intertemporal credit rationing. The model assumes that this nation produces exportable (X) and nontradable (N) goods and consumes the importable (M) as well as the nontradable goods. Nationals of this country hold both local money (M) and foreign money (F). The private sector has inherited a given stock of foreign money. The government consumes importable and nontradable goods and uses non distortionary taxes and domestic credit creation to finance its expenditures.

The Montiel Model

The Montiel (1999) model builds on the Edwards (1988) model and it suggests that the actual RER is an endogenous variable which depends on three macroeconomic variables, namely the predetermined, exogenous and the policy variables. Predetermined variables are fixed but may change over time. They are influenced by the prevailing policy and an example of a

predetermined variable is the economy's stock of net indebtedness. Exogenous variables on the other hand are current and expected future values of endogenous variables. The exogenous variables such as world economic conditions are not influenced by the state of the domestic economy (Montiel, 1999:222). The policy variables can be viewed in two parts. The first is a policy variable which depends on the feedback from economic developments and hence it is affected by the state of the economy. The second type of exogenous variable gradually evolves over time irrespective of any feedback from the economy. An example of this type of policy variable is the gradual removal of trade restrictions over time. The predetermined, policy and exogenous variables are all expressed over time because they all typically change over time. In the Montiel (1999)[2] model the long-run equilibrium is based on the permanent values of the policy and exogenous variables as well as the steady-state values of the predetermined variables. This can be expressed in the following way;

$$q^* = f(X_2X_3) - 2.33$$

Where

q* = the long run equilibrium real exchange rate

X_2X_3 = the steady state variables or the long run fundamentals

The Montiel (1999) model builds on the three-good model with the simplifying assumptions of a financially open economy; exports not consumed in the domestic economy, and capital being fixed while labour is mobile across sectors. Generally, the long-run fundamental determinants described in the Montiel (1999) model are similar to those described in the Edwards (1989) model. The Determinants of the Equilibrium RER, Edwards (1989) and Montiel (1999) includes; exchange

[2]See Khan and Montiel (1987), and Edwards (1989) for the theoretical models and comparative static analysis.

controls (Tariffs), openness to trade, terms of trade, capital control (capital flows), government expenditure, technology, the effect of world inflation, external interest rate.

2.4 Theoretical Link between Real Exchange Rate, Monetary and Fiscal Aggergates

Exchange rate and monetary policy are key tools in economic management and in the stabilization and adjustment policies in developing countries. In most developing countries low inflation and international competitiveness have become major policy targets. The real exchange rate is a measure of international competitiveness, while inflation mostly emanates from monetary expansion, currency devaluations and other structural factors. It is already recognized in the literature that the real exchange rate is an endogenous variable that responds to both exogenous and policy induced disturbances and that prolonged real exchange rate misalignment will usually generate macroeconomic disequilibrium (see Elbadawi, 1994; Montiel and Ostry, 1991; Eichengreen, 2008).

The real exchange rate is the relative price of non-traded goods. Except in planned economies, relative prices are not controlled by policy makers directly. Rather, they are the outcome of other policies and processes influencing supply and demand (Eichengreen, 2008). For a small open economy like Nigeria, the world price for tradable good is fixed and can be normalize to unity rendering the real exchange rate to be expressed as the nominal exchange rate relative to the price of non-tradable. Following the work of Dornbusch (1976), there is the tendency for the prices of non-traded good to move sluggishly than nominal exchange rate. Thus, monetary policy shifts and other disturbances that are felt mainly as shocks to financial markets will add to the volatility of the nominal exchange rate and thereby to the real exchange rate. With time, of course, inflation will react, and the prices of nontraded goods will adjust. The implication is that monetary policy cannot be used to sustain a particular real exchange rate, other than that dictated by the

fundamentals, in the long run (Eichengreen, 2008). Also, policies that affect real exchange rate in the intermediate run may be enough to have significant imprint on growth and as a consequence unpredictable shift in monetary policy may lead to instability in the real exchange rate to the detriment of investment, trade and growth. The theoretical link between nominal exchange rate volatility and real exchange rate volatility is much exemplified in the work of Mussa (1986) among other studies. Although, studies by Baxter and Stockman (1988), disputed whether the volatility of the nominal rate also has first-order implications for trade, investment and growth.

Following the basic two sector model of the open economy by Dornbusch (1980), Fiscal policy is likely to have a more sustained impact in a managed float exchange rate regime. Increased public spending falls partly on traded goods whose prices are given, and partly, on non-traded goods, whose prices consequently tend to rise resulting to increase in domestic inflation. The pressure of public spending can therefore cause the real exchange rate to become overvalued. It will shift resources into the production of non-traded goods. Relatively restrictive fiscal policy thus tends to be part and parcel with the maintenance of a competitive real exchange rate and encouragement of export led growth. Mundell (1963) and Fleming (1962) investigated fiscal and monetary policies under fixed and flexible exchange rate regimes and highlighted the role of exchange rate dynamics following a policy shock. The Mundel-Fleming model addressed the mechanism of fiscal policy through change in the path of real exchange rate (intratemporal channel). Expansionary fiscal policy may lead to an increase in the relative prices of domestic goods. Real appreciation, in turn, may negatively affect the current account balance by boosting import and retaining export activity. Finally, government policy may induce shifts in risk premium. Accordingly, fiscal profligacy may result in higher interest rates and the deterioration According to Edwards (1989) theoretical model, at any point in time, the actual or observed real exchange rate will depend on the value of

fundamentals (i.e tariffs, international prices, real interest rate and so on) and also on aggregate macroeconomic pressures, such as excess supply for money and fiscal deficit with reference to different exchange rate regime (fixed nominal exchange rate regime and its variants including managed and crawling rates, floating rates and non-unified exchange rate systems, including dual rates and a case where a significant parallel foreign exchange market coexist with the official market). A key feature of open economy macroeconomics is that in order to have sustainable macroeconomics equilibrium it is necessary that monetary and fiscal policies are consistent with the chosen nominal exchange rate regime. This means that the selection of an exchange rate system imposes certain limitations on the extent of macro policies. In other words, if this consistency is violated severe disequilibrium situation will take place in form of exchange rate misalignment.

Under predetermined nominal exchange rate monetary policy constitute an important source of macroeconomic inconsistencies. In other words, increase in domestic credit at rates that exceed the growth in the demand for domestic money will be inconsistent with the maintenance of the fixed nominal rate. Under the circumstances where excess of domestic credit creation exceed money demand growth could translate into an excess demand for tradable goods, nontradable goods and financial assets. In this case, the excess demand for tradables will be reflected in a higher trade deficit (or lower surplus), loss of international reserve, and in an increase in (net) foreign borrowing above its long run sustainable level while the excess of nontadable will be translated into higher prices for those goods and consequently into a real exchange rate appreciation. If there are no changes in the fundamental real determinants of the equilibrium real exchange rate this real appreciation induced by the expansive domestic credit policy will represent a departure of the actual real exchange rate from its equilibrium value, or real exchange rate misalignment Edward (1989).

Under flexible exchange rate regime, if assets (including foreign exchange) market adjust instantaneously, while nontradable goods market adjust only slowly, a monetary expansion result in an instantaneous jump of the nominal exchange rate that will exceed the long run equilibrium nominal depreciation, prices of nontradable will remain constant in the short run. With time passes, however, domestic prices will increase towards their new equilibrium level compatible with the higher stock of money, and the nominal exchange rate will decrease towards its new post monetary expansion equilibrium of the nominal exchange rate, hence the real exchange rate.

Table 2.1 Summary of some Theoretical Issues in Equilibrium Exchange Rate./ Adopted in Driver and Westerway (2004)

	UIP	PPP	Balassa-Samuelson	Monetary Models	CHEERs	ITMEERs	BEERs	FEERs	DEERs	APEERs	PEERs	NATREX	SVARs	DSGE
Name	Uncovered Interest Parity	Purchasing Power Parity	Balassa-Samuelson	Monetary and Portfolio balance models	Capital Enhanced Equilibrium Exchange Rates	Intermediate Term Model Based Equilibrium Exchange Rates	Behavioural Equilibrium Exchange Rates	Fundamental Equilibrium Exchange Rates	Desired Equilibrium Exchange Rates	Atheoretical Permanent Equilibrium Exchange Rates	Permanent Equilibrium Exchange Rates	Natural Real Exchange Rates	Structural Vector Auto Regression	Dynamic Stochastic General Equilibrium models
Theoretical Assumptions	The expected change in the exchange rate determined by interest differentials	Constant Equilibrium Exchange Rate	PPP for tradable goods. Productivity differentials between traded and non-traded good	PPP in long run (or short run) plus demand for money	PPP plus nominal UIP without risk premia	Nominal UIP including a risk premia plus expected future movements in real exchange rates determined by fundamentals	Real UIP with a risk premia and/or expected future movements in real exchange rates determined by fundamentals	Real exchange rate compatible with both internal and external balance. Flow not full stock equilibrium	As with FEERs, but the definition of external balance based on optimal policy	None	As BEERs	As with FEERs, but with the assumption of portfolio balance (so domestic real interest rate is equal to the world rate)	Real exchange rate affected by supply and demand (but not nominal) shocks in the long run	Models designed to explore movements in real and/or nominal exchange rates in response to shocks
Relevant Time Horizon	Short run	Long run	Long run	Short run	Short run (forecast)	Short run (forecast)	Short run (forecast)	Medium run	Medium run	Medium / Long run	Medium / Long run	Long run	Short (and long) run	Short (and long) run
Statistical Assumption	Stationarity (of change)	Stationary	Nonstationary	Nonstationary	Stationary, with emphasis on speed of convergence	None	Nonstationary	Nonstationary	Nonstationary	Nonstationary (extract permanent component)	Nonstationary (extract permanent component)	None	As with theoretica	As with theoretica
Dependent Variable	Expected change in the real or nominal	Real or Nominal	Real	Nominal	Nominal	Future change in the Nominal	Real	Real Effective	Real Effective	Real	Real	Real	Change in the Rea	Change relative to long-run steady state
Estimation Method	Direct	Test for stationarity	Direct	Direct	Direct	Direct	Direct	Underlying Balance	Underlying Balance	Direct	Direct	Direct	Direct	Simulation

2.5 Empirical Literature Review

2.5.1 Nigerian Case Studies

Following the seminal work of Edwards (1988) that found a significant negative relationship between economic growth and overvaluation, a number of studies have attempt to test the relationship between exchange rate misalignment and economic performance (usually growth) in Nigeria. For instance, Ali, Ajibola, Omotosho, Adetoba and Adeleke (2015) found that a unit increase in misalignment would lead to a reduction in output by about 0.003. Also, Ibrahim (2016b) used the BEER framework to estimate the real exchange rate misalignment; the GMM estimate reveals that real exchange rate misalignment has negative but significant impact on economic growth over the period under consideration. Similarly, Ibrahim (2015d) examined the growth-misalignment nexus using the BEER approach, the ARDL estimate suggest that a 10% increase (appreciation) in real exchange rate misalignment can decrease per capita GDP growth by up to 17.9%. Mapenda (2010) also used the Johansen approach and the Vector Error Correction Model (VECM) to evaluate the long-run determinants of the exchange rate in Ghana and Nigeria. The empirical results for Ghana revealed that any increase in government consumption expenditure, the terms of trade, net foreign aid inflow and openness significantly led to currency depreciation, while an increase in world cocoa prices appreciated the Ghanaian currency. On the other hand, an increase in world oil prices and government consumption expenditure appreciated the Nigerian currency, whereas a rise in net foreign assets devalued the Naira.

Agu (2002) estimates the time path of the naira equilibrium exchange rate between 1970 and 1998 using fundamentals such as trade policy, terms of trade, government consumption expenditure, capital flows, and debt to GDP ratio. His estimated result showed that real exchange rate misalignment in Nigeria was irregular but persistent. The result also showed that the naira was overvalued by an average of about 1.4 per cent during the period. He confirmed that real exchange rate misalignment and its volatility affects both the trade balance and the capital account. Else where in the literature, Soludo and Adenikinju, (1997) found

that misalignment series have significant negative impact on manufacturing investment, while Ogun, (1998) found that both RER misalignment and volatility adversely affected the country's non-oil export growth.

Another strand of empirical work by Ononugbo (2005) investigated the long run cointegration between naira exchange rate and relative price levels in Nigeria and USA. He used the error correction model within the PPP framework and accounted for exchange rate regime change, from the result, the nominal exchange rate during the study period followed the long run path suggested by the PPP. The result also showed that the naira nominal exchange rate was overvalued by 9.48 per cent in 2003.

Other studies like Nwokoye, Zubairu and Ayuba (2015) investigates the relationship between exchange rate misalignment and stock market volatility during pre and post financial liberalization era using Granger-Causality technique between the period 1985:Q1-2011:Q4. The result shows that exchange rate misalignment had a negative and insignificant relationship with stock market volatility. Another study by David and Ojegba (2013) analyse the relationship between exchange rate misalignment and balance of payments (BOP) mal-adjustment within the BEER framework and found that exchange rate misalignment exhibited a positive relationship with BOP and a unidirectional causality running from exchange rate misalignment to balance of payments adjustment in Nigeria was found at the 1% level. Empirical evidence on Nigeria has also shown that overvaluation has higher tendency to currency crises, for instance, Omotosho, (2015) examined the extent to which currency misalignment could serve as an early warning signal for currency crisis, and the result shows that the likelihood of currency crisis increases when the real exchange rate is misaligned.

Another study by Omotosho and Wambai (2005) used two approaches and arrived at an average misalignment of between 2.8% and 5.2% using fundamental equilibrium exchange rate approach (FEER) and a misalignment of between 35.6% and 42.2% using the purchasing power parity approach (PPP).The literature reviewed above shows that most of the empirical work on exchange rate misalignment concentrated on index of growth (investment, total factor productivity, manufacturing sector),

currency crisis etc. These studies failed to account for the separate effect of overvaluation/undervaluation on the macroeconomic variables of interest. By trying to disentangle causation from correlation, this work addresses this gap with the use of episodic approach to the data.

Table 2.2 Summary of Empirical Literature (Nigerian Case Studies)

Author/Year/ Country/Period	Problems	Model	Methodology	Findings
Soludo and Adenikinju (1997) Nigeria	To examine the effect of real exchange rate movements (define in terms of misalignment and volatility) on the growth of non-oil export.	BEER	Cointegration and error correction model	They found that misalignment series have significant negative impact on manufacturing investment.
Ogun (1998) Nigeria (1960-1990)	To examine the effect of real exchange rate movements (define in terms of misalignment and volatility) on the growth of non-oil export.	BEER	OLS	The results show that irrespective of the misalignment generating framework adopted, both RER misalignment and volatility adversely affected the country's non-oil export growth. However, the results under the model based approach appear to be relatively more credible.
Agu (2002) 1970-1998 Nigeria	To estimate the time path of the naira equilibrium exchange rate and its misalignments	BEER	Cointegration	The result showed that real exchange rate misalignment in Nigeria was irregular but persistent. The naira was found to be overvalued by an average of about 1.4 per cent during the period. He also confirmed that real exchange rate misalignment and its volatility affects both the trade balance and the capital account.
Ononugbo (2005) 1970-2003 Nigeria	To investigate the long run cointegration between naira exchange rate and relative price levels in Nigeria and USA	PPP	Cointegration	The nominal exchange rate during the study period followed its long run path suggested by the PPP. Also, the results showed that the naira nominal exchange rate was overvalued by 9.48 per cent in 2003

Mapenda, (2010) Nigeria and Ghana	To evaluate the long term determinants of real exchange rate and its misalignment	BEER	VECM	The empirical results for Ghana revealed that any increase in government consumption expenditure, the terms of trade, net foreign aid inflow and openness significantly led to currency depreciation, while an increase in world cocoa prices appreciated the Ghanaian currency. On the other hand, an increase in world oil prices and government consumption expenditure appreciated the Nigerian currency, whereas a rise in net foreign assets devalued the Naira
(Aliyu, 2011) 1986:Q1-2006:Q4 Nigeria	To estimate long run behavioral equilibrium exchange rate	BEER	Johansen Cointegration	The results suggest that large inflow of oil revenues into the country and stable macroeconomic performance accounted for undervaluation of the real exchange rate between 2003Q3 and 2004Q4 and overvaluation in 2005Q1 and 2006Q4.
Ibrahim, W (2013a) Nigeria 1960-2011	To investigate the effect of capital flow in Nigeria and its effect on exchange rate misalignment	BEER	Cointegration	Exchange rate misalignment has a significant depreciating effect on the flow of FDI in Nigeria
David and Ojegba (2013) 1973-2012 Nigeria	To analyse the relationship between exchange rate misalignment and balance of payments (BOP) mal-adjustment.	BEER	VECM	The result shows that exchange rate misalignment exhibited a positive impact on the country's balance of payments position. In addition to the VECM estimates, the Granger pair-wise causality test results indicated a unidirectional

				causality running from exchange rate misalignment to balance of payments adjustment in Nigeria at the 1% level
Theresa, Okoye, Anyanwu and Okoli (2014). 1960-2010 Nigeria	To the impact of real exchange rate (RER) misalignment and its volatility on the Nigerian agricultural sector	BEER	VECM	They found that real exchange rate misalignment and volatility negatively affect the agricultural sector. The findings also reveal that real exchange rate appreciation discourages growth in the agricultural sector.
Nwokoye, Zubairu and Ayuba (2015) 1985:Q1-2011:Q4 Nigeria	To investigates the relationship between exchange rate misalignment and stock market volatility during pre and post financial liberalization era	BEER	Granger-Causality	The result shows that exchange rate misalignment had a positive but insignificant relationship with stock market volatility before the deregulation of the financial market in Nigeria. In the era of financial liberalization, they observed that exchange rate misalignment had a negative and insignificant relationship with stock market volatility
(Omotosho, 2015) 1990:Q1-2011:Q2 Nigeria	To examine the extent to which currency misalignment could serve as an early warning signal for currency crisis	BEER	Cointegration/ Logit Model	The result shows that the likelihood of currency crisis increases when the real exchange rate is misaligned; the exchange rate is volatile; oil price declines; debt/GDP ratio increases; and the current account balance to GDP ratio declines.
Ali, Ajibola, Omotosho, Adetoba and Adeleke (2015)	To investigate the impact of naira real exchange rate	BEER	Cointegration	The result shows that the coefficient of real exchange

2000:Q1-2014:Q4 Nigeria	misalignment on economic growth			rate misalignment was negative and statistically significant. Implying that a unit increase in misalignment would lead to a reduction in output by about 0.003
Ibrahim, W (2016b) Nigeria 1960-2011	To examine the impact of real exchange rate misalignment on economic growth	BEER	GMM	The GMM estimate reveals that real exchange rate misalignment has negative but significant impact on economic growth over the period under consideration.
Nwachukwu et al (2016) 1990-2014 Nigeria	To examine the relationship between relevant macroeconomic variables and the real effective exchange rate	BEER	ARDL	On the average real exchange rate was found to be overvalued by 1.40% during the study period with consequences for the economy.

2.5.2 Other Countries Case Studies

One of the most controversial topics in international finance literature relates to the determinants of real exchange rate. Several theories have been developed in recent time, but the earliest and most controversial is the purchasing power theory (PPP) and the Williamson (1983) concept of fundamental equilibrium exchange rate (FEER). While the former refers considers equilibrium to be a point, the later considers it to be a trajectory. However, despite the apparent lack of consensus on how the equilibrium real exchange rate is determine, empirical literature has shown that exchange rate misalignment which could either be overvaluation or undervaluation has implication on misallocating resources between tradable and non-tradable goods. In particular real exchange rate overvaluation could precipitate unsustainable macroeconomic condition in a country (Williamson 1994, Edwards 1989). By contrast, persistent real undervaluation cold lead to economic overheating, this put pressure on domestic prices and misallocates resources between tradable and non-tradable sector of the economy, while an overvalued exchange rate would have an adverse impact on a country's competitiveness and its growth (Jongwanich, 2009; Fic, Barrel and Holland, 2008). In most developing countries, the real exchange rate is managed to various degrees and is largely determined by economic policies rather than by market fluctuations. The real exchange rate depends on the balance between savings and investment, and on the balance between expenditures and income. Hence, all policies that produce higher savings relative to investment can lead to real exchange rate depreciation. The long run equilibrium exchange rate to which the real exchange rate should gravitate is defined as an exchange rate that is compatible with simultaneous attainment of both external and internal balance (Stein, 2011).

A number of empirical studies on exchange rate fluctuations found that unstable exchange rate hampers growth in trade (Arinze et al 2000; Chowdhury, 1993; Cottani et al 1990; De Grauwe

1988). However, concern about fluctuations in real exchange rate is more worrisome, because it plays a central role as the principal equilibrating variable of a country's international trade and payment, (Harberger, 2004). According to (Razin and Collins, 1997) real exchange rate movements respond to both nominal and real disturbances and inconsistent macroeconomic policies tend to generate a real exchange rate overvaluation. Also, according to Akhtar (2011), misalignment was causally linked to the cyclical components of budget deficit, excess money supply and the cyclical component of the real exchange rate. The real exchange rate's level, relative to an equilibrium real exchange rate, and its stability have been shown to importantly influence export growth, consumption, resource allocation, employment and private investments. Sustained overvaluation has been linked to lower long-run economic growth (Aguirre and Calderón, 2006; Hnatskova and Loayza, 2004; Macdonald & Macdonald, 2010; Sallenave, 2010; Aflouk & Mazier, 2011; Grekou, 2015; Musyoki, Ganesh, & Moses, 2014; Missio, Jr, Britto, & Oreiro, 2015; Ndhlela, 2012; Schröder, 2013; Razin and Collins, 1999; Prasad, Rajan and Subramanian, 2006; Gala, 2008), besides finding negative relation between overvaluation and growth Elbadawi, Kaltani and Schmidt-Hebbel (2008) also found that foreign aid interact negatively with overvaluation. Further empirical evidence from the work of Rodrik (2008) and Berg and Miao (2010) have shown that not only does overvaluation damage growth, but also that undervaluation benefits growth. However, Williamson (2008) opined that "The evidence that overvaluation hurts development is now sufficiently strong to merit being reflected in policy, including delay to capital account liberalization where it appears likely to threaten overvaluation". He went further to suggest that "the very best policy (in terms of maximizing growth) appears to be a small undervaluation". Although the result obtained by Owoundi, (2015) for 16 Sub-Saharan countries shows that the gain relating to the growth effect of undervaluation is almost zero. While

Tang (2015), in his study of the Chinese economy found that there is no direct link between real exchange rate and growth.

The effect of exchange rate misalignment in currency union stems from the observed imbalances inside the euro area which emanated from the disruptive movement in real exchange rate. Although, nominal exchange rate was pegged, movement in real exchange rate exacerbated by inflation differentials has continued to hit the peripheral countries that constitute members of the European Union. Such higher inflation in the peripheral countries has resulted in an appreciation of their real exchange rates beyond the expected Balassa–Samuelson effect, which has eroded their competitiveness and their external trade (Mongelli and Wyplosz, 2008). Similar study by Chan (2010), confirm that high exchange rate misalignment on West African Monetary Zone (WAMZ) countries impose high cost on the road to monetary union. Bernd and Michael (1999), also posits that lack of credibility of ERM currency bands occur in countries with persistent misalignment.

Empirical evidence has also shown that overvaluation has higher tendency to currency crises (Burkart and Coudert, 2002; Pfeffermann, 1985; Holtemöller & Mallick, 2013; Omotosho, 2015). Countries that have avoided persistent overvaluation, on the other hand, have been associated with foreign trade deepening and export diversification (Dollar, 1992; Elbadawi, 2002; Sekkat, 2015), Altingo-ego and Sebudde (2004) also found that causality runs from non-traditional export to overvaluation. In addition, other studies like (Ebaidalla, 2014; Jongwanich, 2009) have shown that real exchange rate misalignment could have a negative impact on export performance.

The theoretical/empirical question in the measurement of equilibrium exchange rate and its misalignment, is, what constitute the precise estimate of exchange rate misalignment? Or what model defines the actual real effective exchange rate from its trajectory? Apparently there are

controversies in the literature about what constitute the measure of equilibrium exchange rate and by implication its misalignment. For instance, the World Bank and IMF pre-SAP evaluation of most Sub-Saharan African countries especially Nigeria is that the real exchange rate was overvalued based on the Williamson's framework of 1983. Saxegaard and Tsangarides, (2007)used different econometrics method to investigate the long run equilibrium path of REER of countries in the West African Economic and Monetary Union (WAEMU), the result suggest that there is significant uncertainty about the path of EREER and thus the degree of misalignments. Lopez-villavicencio, Mazier and Saadaoui, (2012) investigate the temporal links between two models of equilibrium exchange rate FEER and BEER for 14 Emerging and 4 Industrialized countries, the result shows that on the average the two measures are closely related. Similar study by Salto and Turrini, (2010) for 24 EU countries also confirmed that FEER and BEER estimate are similar.

The use of different econometric techniques and theoretical frameworks suggests that there is significant uncertainty about the path of the underlying equilibrium REERs and the degree of exchange rate misalignment. These relate to a number of factors, such as the potential instability of the underlying macroeconomic links, differences in these links across countries, significant measurement problems for some variables, including the choice of a model to describe the behavior, the time frame of the analysis, the actual estimation method as well as the imperfect "fit" of the models. Some of these problems may be more severe in developing countries like Nigeria due to data limitation which has led to the use of proxies for some variables of interest. All these problems underscore the need for robustness analysis in exchange rate modeling. The entry point of this work is to contribute to the systematic evaluation of the equilibrium exchange rate of the naira. In doing so, this work utilizes four measure of equilibrium exchange rate which includes;

FEER, BEER, NATREX and SVAR approaches, the robustness test use for model selection is the forecast evaluation, in which case we use the root mean square error, mean absolute error.

Table 2.3: Summary of Literature Review (Other Countries Case Studies)

Author/Year/ Country/Period	Problems	Model	Methodology	Findings
(Cottani, Cavallo, & Khan, 1990) 24 LDC Countries 1960-1983	To examine the correlation between performance indicator, instability and misalignment	PPP	OLS	The results show that a strong negative correlation across countries exists between performance indicators and two measures of RER behavior, instability and misalignment
(Bailey, M.J and Tavlas, 1991) 1976:Q1-1986:Q3 United States	To investigates the relationship between exchange rate variability and direct investment	FEER		The findings shows that the increased variability of exchange rates under the managed floating system has not been harmful to direct investment
(Artis & Taylor, 1995) 1995:Q1-2007:Q3 Greece, Poland, Slovenia and Spain	The result shows that exchange rate misalignment in the late comer countries were substantially more volatile than the forerunners countries as a result of both nominal exchange rate volatility and unsettled inflation	FEER	NIGEM	Exchange rate misalignment have narrowed in both the Euro Areas and Central European Countries, which is in part driven by inflows of FDI and corresponding improvements in trade balances
(Ikoba, Nyatepe-coo, & Owoye, 1996) 6 Sub Saharan African Country 1960-1991	To examines the relative contributions of domestic and external factors to real exchange rate.	BEER	VAR	The results suggest that external factors such as the terms of trade and foreign income were as important as domestic policy mistakes in causing real

				exchange rate misalignment in Sub Saharan Africa.
(Valds, 1996) 1960-1994 93 Countries	To study the dynamics of appreciation and to analyze the mechanism by which overvaluation are corrected	PPP	Transition Matrix	The result shows that appreciations have a longer duration in the build-up than in the return phase and are more likely to occur in fixed exchange regimes and that it is relatively unlikely to smoothly undo appreciations greater than 25%.
(Razin & Collins, 1997) 1975-1992 93 Countries	To empirically explore the relationship between real exchange rate and economic growth	IS-LM Model	OLS	There are important nonlinearities between misalignment and growth. Very high over valuation is associated with slower economic growth while moderate to high undervaluation is associated with more rapid economic growth.
(Bernd & Michael, 1999) 1987:01-1996:12 7 EU countries	To investigate the link between currency misalignment and realignment risk in a currency union	UIP	OLS	The result shows that lack of credibility of the ERM currency bands occurs in countries with substantial swings and persistent misalignments of real exchange rate
(Adam, Bevan, & Chambas, 2001) 1980-1996	To examine to what extent the differential and relatively poor		GMM	Structural and environmental factors were very important,

Selected Sub-Saharan African countries	revenue performance could be attribute to movement in equilibrium exchange rate			explaining the fact that during the early 1990s the failure to eliminate exchange rate misalignment contributed a large proportion of the short fall in revenue.
(Rahman & Basher, 2001) 1977-1998 Bangledesh	To examine the real exchange rate behaviour and exchange rate misalignment	PPP	Cointegration Approach	The result reveals that the currency was highly overvalued until late 1980s. However, it was in equilibrium in the 1990s.
Gauthier and Tessier (2002) 1961-2001 Canada	To study the impact of supply shock on real exchange rate	SVAR	SVEC	A positive supply shock in favour of Canada leads to a real exchange rate appreciation. Also, commodity price shock tend to be an important determinants of exchange rate movement over the short and medium term
(Egert & Lahreche-Revil, 2003) 1991:Q1-2001:Q2 Polish, Czech, Slovenian, Hungarian and Slovakia	To estimate the real equilibrium exchange rate for 5 Central and Eastern European countries in the prospect of their future E(M)U entry.	FEER	Johansen Cointegration	The Polish, Czech and Slovenian currencies does not appear at their equilibrium value whereas the Hungarian and Slovenian currencies turn out fairly-valued.
(Civcir, 2003) 1987:01-2000:12 Turkey	To examine the validity of purchasing power parity in evaluating whether the Turkish	PPP	Cointegration	The findings give mixed results on bilateral exchange rates based on CPI and WPI. While the WPI-

	lira was overvalued on the eve of the 2001 crises			based bilateral real exchange rate gives undervaluation, the CPI-based bilateral real exchange rate and trade-weighted real exchange rates based on WPI reveal that Turkish lira was overvalued before the eve of 2001 crises.
(Nilsson, 2004a)	To examines the long-run relationship between the real effective exchange rate and its fundamental determinants.	BEER	Johansen Cointegration	The results indicate that the krona was severely overvalued in late 1992, when the fixed exchange rate regime was abandoned. By the end of 2000 the krona was undervalued by approximately 5 percent, given the prevailing economic conditions.
(Atingi-ego & Sebudde, 2004) Uganda 1972-1999	To examine the relationship between exchange rate misalignment and nontraditional export	BEER	Cointegration and Granger Causality.	The result shows that causality runs from nontraditional export to overvaluation. The cointegration result also suggests that there is unique vector that depict a stationary relationship overvaluation and nontraditional exports.

Bjornland (2004) 1985:Q1-1999:Q1 Venezuela	To determine whether the real exchange rate is misaligned with respect to its long run value	SVAR	SVAR	The result shows that the behavior of the real exchange rate is not related to PPP. The model implies that exchange rate is overvalued by the late 90s
(Clark & Macdonald, 2004) 1960-1997 US, Canada and Britain	To provide an extension of BEER approach to exchange rate analysis by providing a decomposition of BEER into its permanent and transitory components	BEER/PEER	Cointegration	The BEER and the PEER move closely together for the U.S. and Canadian dollars and generally track the actual exchange rate. By contrast, for the pound sterling, the BEER and the PEER diverge sharply, with the latter following the actual exchange rate quite closely.
(Nilsson, 2004) 1982:Q1-2000:Q4 Sweden	To examines the equilibrium REER and its misalignment	BEER	VAR	The results indicate that the krona was severely overvalued in late 1992, when the fixed exchange rate regime was abandoned. By the end of 2000 the krona was undervalued by approximately 5 percent
(Civcir, 2004) 1987:01-2000:12 Turkey	To evaluate whether the Turkish Lira was overvalued before the eve of the 2001financial crisis	Monetary model	Cointegration	The calculated misalignment figures show substantial overvaluation before the crisis

(Koranchelian, 2005) 1970-2003 Algeria	To estimate the equilibrium real exchange rate and its misalignment.	BEER	VECM	The long run real exchange rate is time varying and depends on movement in relative productivity, real oil price. The result replicate most recognized periods of overvaluation.
(Bouoiyour & Rey, 2005) 1960-2001 Morocco	To study the real effective exchange rate of the dirham against the European currencies (EU15)	NATREX	Cointegration	Both misalignment and volatility affected trade flows (imports and exports)
(Qayyum, Khan, & Khair-u-Zaman, 2005) 1982:Q2-2002:Q2 Pakistan	To test the validity of Purchasing power parity theory and exchange rate misalignment	PPP	Cointegration	The long run validity of PPP could not be rejected; the speed of adjustment is slow indicating that misalignment is eliminated in absence of shock but only after a substantial period of time. The exchange rate remained undervalued vis-a-vis US dollar since the adoption of managed floating exchange rate system.
(Kemme & Roy, 2006) 1995:01-2001:12 Russia & Poland	To examine if exchange rate misalignment is a prelude to crisis	BEER	Cointegration	The result from the dynamic forecasts indicates that the movements of the real exchange rate in the post-crisis period are significantly different from those in the pre-crisis period. Thus, the currency crisis in Russia could not be anticipated with the movements of the real exchange rate estimated with the macroeconomic fundamentals.
(Kemme & Roy, 2006) 1995:01-2001:12 Russia and Poland	To investigate if real exchange rate misalignment is a prelude to financial crisis.	BEER	OLS, ARCH and GARCH	The result for Poland indicates that as the nominal exchange rate regime became more flexible, real misalignment decreased. For Russia the misalignment results suggest that significant overvaluation of the ruble, nominal exchange rate rigidity,

				and mistaken macroeconomic policies in the pre-crisis period are the source of the currency crisis in Russia.
Mehrara (2006) Iran	To clarify and calculate the concept of equilibrium real exchange rate	SVAR	SVAR	The evidence shows that the behavior of the real exchange rate is not implied by PPP. The overvaluation of the real exchange rate is relatively small compared to PPP.
(Saxegaard & Tsangarides, 2007) WAEMU/ 1970-2005	To investigate the long-run equilibrium paths of the real effective exchange rates (REERs) of countries in the West African Economic and Monetary Union (WAEMU). In an attempt to address econometric estimation uncertainty.	FEER	Johansen/ARDL/FMOLS & PMG	The use of different econometric technique suggests that there is significant uncertainty about the path of the EREER in WAEMU countries and thus about the degree of exchange rate misalignment.
(Cheng & Orden, 2007) 1985-2002 India	To examine the effect of exchange rate alignment on agricultural producers support estimate	BEER	Cointegration	The results show that the exchange rate was substantially misaligned before a financial crisis and macroeconomic reform in the early 1990s, with subsequent indirect effects on the PSEs. So that removal of the exchange rate misalignment would have improved incentives to Indian farmers during this period.

(Y. Cheung, Chinn, & Fujii, 2007) 160 Countries 1975-2004	To evaluate whether the renminbi (RMB) is misaligned	PPP	Pooled OLS	By accounting for sampling uncertainty and serial correlation, there is little statistical evidence that the RMB is undervalued. The result is robust to various choice of a country sample, sample period and control variables
(I. Elbadawi, Kaltani, & Schmidt-Hebbel, 2008) 1970-2004	To determine the time profile of aid, RER misalignment and growth during the post conflict cycle	BEER	Cointegration	The result shows that Aid exhibits decreasing returns, and interacts negatively with RER overvaluation. RER overvaluation reduces growth, but this effect is ameliorated by financial development
(Kinkyo, 2008) 1981:Q1-2001:Q3 Korea	To examine the relationship between equilibrium exchange rate and currency crisis	BEER	VAR	The estimation result suggest that the real exchange rate was substantially overvalued prior to the crisis of 1997-1998
(I. Elbadawi, Kaltani, & Schmidt-Hebbel, 2008) 1970-2004	To determine the time profile of aid, RER misalignment and growth during the post conflict cycle	BEER	Cointegration	The result shows that Aid exhibits decreasing returns, and interacts negatively with RER overvaluation. RER overvaluation reduces growth, but this effect is ameliorated by financial development
(Kinkyo, 2008) 1981:Q1-2001:Q3 Korea	To examine the relationship between equilibrium exchange rate and currency crisis	BEER	VAR	The estimation result suggest that the real exchange rate was substantially overvalued prior to the crisis of 1997-1998

(Koske, 2008) 1980-2006 Malaysia	To assess the equilibrium exchange rate of the Malaysian ringgit using two alternative methodology	FEER	Cointegration	The two models suggest that the ringgit was over- valued in real effective terms prior to the Asian crisis in 1997/1998. The sharp depreciation of the ringgit exchange rate during 1997 and 1998 was, therefore, mostly supported by economic fundamentals
(Jongwanich, 2009) Developing Asian Countries, 1995-2008	To examined the relationship between real exchange rate misalignment and export.	BEER	Johansen Cointegration	The study shows that real exchange rate misalignment could have a negative impact on export performance in developing Asia.
(Fic, Barrell, & Holland, 2008) 1995-2005 8 EU Countries	To investigate the effect of exchange rate misalignment of the entry rate for some EU countries.	FEER	Macro-Model	The result shows that the small and Baltic economies may experience difficulties with meeting the inflation criterion which may be the result of unsound macroeconomic policies
Imam, and Minoiu (2008) 1980-2007 Mauritius	To assess competitiveness through equilibrium exchange rate.	FEER/CHEER	Cointegrration Approach	The result shows that all the formal approaches are close to their equilibrium value.
Babetskss and Egert (2008) Czech 1993:M1-2004:M9	To investigate whether or not the observe real exchange rate is close to its equilibrium	SVAR	SVAR	The structural decomposition shows that relative real demand and supply shock account for most of the variation in real exchange rate changes
(Cuestas & Gil-Alana, 2009)	To investigate the empirical validity of Purchasing Power Parity	PPP	Non Linear STAR Framework	The results point to the rejection of the PPP hypothesis, although the finding shows that the degree of persistence of shocks to the Australian dollar decreases after the 1985 currency crisis.
(Joanna & Macdonald, 2009) 1998:03-2007:12	To compute measures of current and total misalignment and to check the sensitivity of	BEER/PEER	Cointegration	The models indicate that since the EU accession, the real PLN/EUR rate development was

Poland	the equilibrium rate to risk premium			broadly in line with the current and medium-run equilibrium rate with a decrease in the misalignment magnitude and persistence is accompanied by gradual appreciation of the equilibrium rate
(Agnes Benassy-Quere, Bereau, & Mignon, 2009) 15 Countries from the G20 1980-2005	To estimate the robustness of equilibrium exchange rate	BEER	Panel Cointegration	The main conclusion is that BEER estimations are quite robust to these successive tests, although at one point of time misalignments can differ by several percentage points depending on the methodology. The choice of the productivity proxy is the most sensible one.
(Sidek & Yusoff, 2009) 1991:Q1-2008:Q1 Malaysia	To estimate the equilibrium exchange rate of the Malaysian Ringit and its misalignment	BEER	Cointegration	Results suggest that the ringgit was persistently overvalued prior to the 1997 crisis. After the crisis, the ringgit fluctuates around its long run equilibrium and the misalignments are eliminated over a relatively short period.
(Dubas, 2009) 1973-2002 102 Countries	To explore how the choice of a country's exchange rate regime may affect exchange rate misalignment for developing and developed countries	BEER	FMOLS/DOLS	This paper finds that for developing countries, an intermediate exchange rate regime (a regime falling somewhere between a pure float and a hard peg) is most effective in preventing exchange rate misalignment.
(Grenade & Riley, 2009) 1990-2007 EECU Countries	To identify the possible cause and extent of any misalignments in the real exchange rate.	BEER	VECM	The results indicate that in the early part of the sample, the REER was closely aligned with its equilibrium value. From about 2001 however, the REER became misaligned in at most two countries. The empirical analysis presented here highlights the important roles

				that fiscal policies and capital inflows play in real exchange rate movements.
(Rubaszek & Rawdanowicz, 2009) 1995-2008 Central and Eastern European Countries	To show that under some plausible assumption , the FEER is a reduce form of BEER	FEER/BEER	Panel Cointegration	BEER is consistent with the FEER calculation which shows that the appreciation of the real exchange rate in these countries is largely an equilibrium phenomenon
(Jeong, Mazier, & Saadaoui, 2010) United States, Japan, China, the Euro area, the United Kingdom and the Rest of the World 1980-2003	To assess the equilibrium exchange rate of countries of the Euro area and compare them with the equilibrium exchange rate of the global Euro	FEER/Symetric Matrix Inversion Method (SMIM)	Fixed Effect and Pooled OLS	Current account imbalances have increased dramatically since the mid-90s and were only partly reduced since the burst of the crisis in 2007. These imbalances reflect exchange rate misalignment.
Chan, T (2010) Gambia, Ghana, Guinea, Nigeria and Siera-leone 1980-2005	To investigate the potential cost of membership in a monetary union by examining the degree of exchange rate variability of WAMZ member countries	BEER	Panel data, GLS and Single equation model	Exchange rate misalignment has increased substantially across WAMZ countries imposing high cost on the road to monetary union
(Belloc & Federici, 2010) 1975-2003 Euro zone and the US	To develop a NATREX model of Euro Zone and the United State that is allowed to interact	NATREX	FIML	The NATREX model single out two periods of strong overvaluation of the USD, in the mid-eighties and after the launch of the Euro. Finally, the out-of-sample simulation indicates that the current strong depreciation of the US dollar has led the Euro/USD exchange rate to achieve and even overshoot the equilibrium value at the end of 2006.
(Terra & Valladares, 2010) 1960-1998 85 Countries	To investigates episodes of real exchange rate appreciations and depreciations	BEER	Markov Switching Model	The findings shows that some countries present no evidence of distinct misalignment regimes; second, for some countries there is no RER misalignment in one of

				the regimes; and, third, for the countries with two misalignment regimes, the appreciated regime has higher persistence than the depreciated one
Sanusi, A. R (2011) 1960-2005 Ghana	To investigate the impact of foreign aid inflow on real exchange rate via the dutch disease channel	BEER	Cointegration	it is found that foreign aid inflows do have a significantly positive effect on the real exchange rate in the long-run, but not in the short-run.In the long-run, however, when all aid increases were spent, real appreciation could be expected as the theory predicts.
(Benassy-Quere, Lahreche-Revil, & Mignon, 2011) 15 of the G20 countries 1980:Q1-2004:Q3	To propose a systematic analysis of the problem of world consistency when deriving equilibrium exchange rate	BEER	Panel Cointegration	The results show that the way the rest of the world is tackled has a major impact on the calculation of effective misalignments and especially bilateral misalignments.
(Akhtar, 2011) 1972-2008 India	To review the evolution of exchange rate policy and review the real exchange rate behavior.	BEER	ARDL/Granger-Causality	Except for the period 1998-2004 there was no significant real exchange rate misalignment and the Granger Causality suggest that the real exchange rate misalignment was causally linked to the cyclical components of budget deficit, excess money supply and the and cyclical components of real output
(Aflouk & Mazier, 2011) 1982-2010 25 Emerging Countries 136 OECD Countries	To examine the link between exchange rate misalignment and growth	FEER	Panel Smooth Transition Regression and GMM	The result shows that the impact of exchange rate misalignment and growth is non linear and positive. An overvaluation has negative impact on growth while

				undervaluations sustain growth until an estimated threshold.
(I. A. Elbadawi, Kaltani, & Soto, 2012) 1980-2004 83 Countries	To investigate the nexus between foreign aid, exchange rate misalignment and economic growth in SSA	BEER	GMM	The result shows that aid is not a major contributor to exchange rate overvaluation. In addition, aid fosters growth but its impact is weaker in countries with overvalued exchange rates. Furthermore, overvaluation reduces growth but its negative effect is ameliorated by financial development.
(Ajevskis, Rimgailaite, Rutkaste, & Tkacevs, 2012) 2001:Q1-2010:Q4 Latvia	To estimate equilibrium real exchange rate and its misalignment.	IMF's CGER SVAR & NATREX	Cointegration Analysis	The results of all approaches used in the study indicate that the real exchange rate of Latvia, after appreciation during the boom years and subsequent adjustment afterwards, remained close to its equilibrium level at the end of the sample period, i.e. at end-2010.
(Lòpez-villavicencio, Mazier, & Saadaoui, 2012) 13 Emerging and 4 Industrialized Countries. 1982-2007	To investigates the temporal links between two models of equilibrium exchange rate, namely the behavioral and the fundamental approaches.	FEER/BEER	FMOLS/DOLS & PMG	On average the two measures are closely related. The differences between the two are temporal disconnection between the current account and the real effective exchange rate, which are probably the result of structural changes in matter of competitiveness.
(Saadaoui, 2012) 1982-2007 17 Industrialized and Emerging Countries	To examine the usefulness of FEER approach in identifying global imbalances	FEER	Cross Sectional Augmented Pooled Mean Group (CAPMG)	The result is consistent with IMF decision as the support the usefulness of the FEER approach.
(Baak, 2012) 1982:Q1-2009:Q4 Korea	To measure the extent to which the Korean Won is misaligned from its equilibrium value.	BEER	Johansen Cointegration	The actual exchange rate deviates from the BEER and from the long-run equilibrium (or sustainable value) of the BEER

				by 32% and by 24% respectively in 2008Q4.
(Ndhlela, 2012) 1985:1-2004:12 Zimbabwe	To examine the effect of real exchange rate misalignment on economic growth	BEER	ARDL	The main findings demonstrate that exchange rate misalignment exerts a negative and highly statistically significant impact on growth. Overall, the results lend support to the hypothesis that chronic real exchange rate overvaluation was a key fundamental behind the post-2000 economic growth contraction in Zimbabwe
(You & Sarantis, 2012) 1982-2010 China	To investigate the equilibrium real exchange rate for the Chinese RMB during the post reform period	NATREX	GLS	The RMB was overvalued until mid-1980s. During 1986-2010, it undervalued in most years except after the Asian financial crisis in 1997. From 2004 onward, there was persistent undervaluation.
(Holtemöller & Mallick, 2013) 1970-2006 69 Countries	To examine the relationship between exchange rate misalignment and currency crisis	BEER	Panel Cointegration	The result shows that the higher the flexibility of the regime the higher, the lower the misalignment and thus the lower is the likelihood of an impending crisis. Higher misalignment in the lead up to the currency crisis in most of the crisis-hit countries shows that there is relationship between misalignment and currency crisis.
(Holtemöller & Mallick, 2013)	To verify the claim that currency board arrangement	FEER	ECM	The result suggests that there were no severe misalignments of

1993:Q1-1999:Q4 Argentina and Estonia	leads to an overvalued exchange rate and significant worsening of current account.			the real exchange rates in currency board countries; overall Argentinean real exchange rate has had periods of relatively small undervaluation and overvaluations of a range of 6%.
(Giannellis & Koukouritakis, 2013) 1980:01-2012:12 USA, Mexico, Uruguay, Venezuela and Brazil	To investigate if nominal exchange rate of four high inflation countries against the US dollar are moving together or not with their equilibrium values.	CHEER	Johansen Cointegration	The empirical evidence show valid long run relationship for each of the four nominal exchange rate.
(Giannellis & Koukouritakis, 2013) 1980-2010 Brazil, Mexico, Uruguay and Venezuela	To examine the relationship between exchange rate misalignment and inflation persistence	CHEER	VAR	The evidence shows that in periods of high exchange rate depreciation of the home currency the domestic inflation rate was persistent, while in periods of slower depreciation, or relative stability it was transitory
(Coudert, Couharde, & Mignon, 2013) 1980-2010 11 Euro zone countries	To assess the real exchange rate misalignment for the Euro area countries	BEER	DOLS	The results show that the peripheral member countries have been suffering from increasingly overvalued exchange rates since the mid-2000s, also, currency misalignments have increased on average for all euro area countries since the monetary union. The result highlights different patterns across member countries.
(Couharde, Coulibaly, & Damette, 2013) 1985-2009 13 CFA countries	To analyze the short run dynamics of real exchange rate of the CFA Franc zone and the role played by the anchor	BEER	DOLS	The result shows that real exchange rate of the CFA franc countries converge relatively slowly towards their equilibrium

	country in their adjustment process.			level. The REER exhibit relatively high inertia, hence, limiting of currency misalignment will overcome the inertia
(Coulibaly & Gnimassoun, 2013) 17 Sub-Saharan African Countries 1985-2009	To study the optimality of a monetary union in West Africa by using a new methodology based on the analysis of convergence and co-movements between exchange rate misalignments	BEER	DOLS/FMOLS	The results show that the WAEMU area is the most homogeneous area in Central and Western Africa and could be joined by Ghana, Gambia and, to a lesser ex- tent, Sierra Leone, and that Ghana and Senegal appear to be the best reference countries for the creation of the whole West Africa monetary union
Rochester (2013) 1994:Q4-2013:Q3 Jamaica	To access the effect of equilibrium exchange rate and competitiveness	FEER	ARDL	The result indicated periods of both undervaluation and overvaluation. More importantly, the exchange rate depreciation since December, 2011 has brought the real exchange rate in line with the equilibrium measure.
(Schröder, 2013) 63 Developing Countries 1970-2007	To re-examine the nexus between real exchange rate and economic growth	BEER	DOLS	The empirical results suggest that deviations of the real exchange rate in either direction from the value that is consistent with external and internal equilibriums reduce economic growth.
(Couharde & Sallenave, 2013) 1980-2009 27 Industrial and Emerging countries	To determine the relationship between regime shift and economic growth.	BEER	Panel Smooth Transition Regression	The findings show that the misalignments index plays a key role in the reversal of trend growth, with undervaluation of

				their currency acting positively on growth,
(Allegret & Sallenave, 2014) 15 Advance and Emerging Countries 1980-2010	To analyze how the misalignment of the dollar, the euro, and the renminbi affect their respective economies and those of their trading partners	BEER	CVAR	The result shows that misalignments significantly affect the world economy and the United States continues to exert a significant influence on the world economy.
(Y.-W. Cheung & Fujii, 2014) 1993-2011 154 Countries	To study the differences in currency misalignment estimates obtained from datasets derived from two different International Comparison Programme (ICP) surveys	PPP	Cross Section Regression	The result reveals that year 2005 misalignment estimates are substantially affected by the ICP price revision, also differences in misalignment estimates are systematically affected by the country's participation status in ICP survey and its data quality
(Nouira & Sekkat, 2015) 1980-2010 51 Developing countries	To examine the effect of exchange rate regime on exchange rate misalignment.	BEER	GMM	The results show that the intermediate regime induces higher and more volatile misalignment than both fixed and float. The fixed regime exhibits a pattern of misalignment similar to the float regime. Inflation pressures and dependence on oil exports are associated with more misalignment.
(Tang, 2015) 1994:01-2012:12 China	To investigates the relationship between the real exchange rate (RER) and economic	BEER	CVAR	There is no direct linkages between real exchange rate and growth
(Galantucci, 2015) USA	To investigate the relationship between legislators who receive financial contributions from interest that relies on the Chinese economy and their likelihood to support currency realignment		MLE	The results suggest that legislators representing interests that rely on China as an economic partner are more likely to withhold support for the legislation. Representatives receiving funds from interests that directly compete with

				Chinese firms are more likely to support the bill
(Gnimassoun & Mignon, 2015) 22 Industrialized Countries 1980-2011	To study whether the persistence of the gap between the observed current-account position and its equilibrium value nonlinearly depends on real exchange-rate misalignments	BEER	Panel Smooth Transition Regression (PSTR)	The result shows that persistence of current-account imbalances strongly depends on the deviation of the real exchange rate from its long-term equilibrium
(Grekou, 2015) 1985-2011 CFA Zone	To revisit the link between currency misalignments and economic growth by taking into account foreign currency-denominated debt dynamics for the CFA zone.	BEER	PSTR	The result shows that the nonlinear impact of currency misalignments on growth through the competitiveness channel is mitigated by the foreign currency- denominated debt dynamics through a valuation effect.
(Missio, Jr, Britto, & Oreiro, 2015) 1980-2008 103 Countries	To investigate the relationship between real exchange rate and growth rate of output	BEER	Cross Section OLS/GMM	The findings show a non-linear relationship between the RER-growth nexus. We conclude that maintaining a competitive level of RER has positive effects on growth rate.
(Owoundi, 2015) 16 SSA Countries 1980-2011	The article explores the growth effects of currency misalignments in Sub-Saharan African countries.	BEER	GMM	The result from the exchange rate regimes as well as cross sectional error dependence shows that the gain related to undervaluation is almost zero regardless of the exchange rate regime
(Sekkat, 2015) 1985-2009 55 Low Income and Middle income Countries	To investigate the conditions under which misalignment could affect export diversification	BEER	GMM	The result show some support to the effect of undervaluation on the share of manufactures in total exports, no support is found for an impact of misalignment (neither over nor under valuation) on exports diversification within manufactures

(Boero, Mavromatis, & Taylor, 2015) 8 Transition Economies of Central & Eastern European Countries 1996:01-201:12	To investigate the way through which capital account affect productivity and the real exchange rate	BEER	Smooth Transition Auto regressive Model	The findings show that the two sources of appreciation of the currencies of these countries are the Harrod-Balassa-Samuelson effect and the capital account effect, and argue that their significance depends on the type of investment received by the countries. While long-run foreign direct investment enhances productivity, porfolio investment leaves productivity unaffected.
(Chen & Macdonald, 2015) 1975Q1-2008Q4	To measure the equilibrium exchange rate using the unobserved components method	PEER	Cointegration	The results show that for most of the sample period, the Euro Dollar exchange rate closely followed the values implied by the PEER. The only significant deviations from the PEER occurred in the years immediately before and after the introduction of the single European currency
(Dumrongrittikul & Anderson, 2016) 1991-2003 14 Asian developing countries	To examines real exchange rate responses to shocks in exchange rate determinants	BEER	DOLS	The result shows that trade liberalization generates permanent depreciation, and higher government consumption causes persistent appreciation. Traded-sector productivity gains induce appreciation but their effects are not immediate and last only for a few years.
(Dumrongrittikul & Anderson, 2016) 1970-2008 14 Asian Developing Countries	To examine real exchange rate response to shocks in exchange rate determinants.	Edward Model	Panel SVAR	The evidence suggests that trade liberalization and government consumption have a strong effect on real exchange rates, while the effects of traded-sector productivity shocks are much weaker.

2.6Overview of Macroeconomic Environment in Nigeria: 1980-2014

2.6.1 Exchange Rate Policy

Prior to the implementation of structural adjustment programme (SAP), the fixed exchange rate system was operable in Nigeria; it was jettison in 1986 after much pressure from the International Monetary Fund (IMF) to devalue the naira in other to boost the external sector of the economy. The major argument was that the naira was over-valued, the value of the naira stood at (₦0.935 = $ 1.00 (US dollar) in 1985). Following the adoption of flexible exchange rate system in 1986, the domestic currency has faced fluctuations both in nominal and real terms. The exchange rate regime has witnessed series of policy reversals due to apparent failure of successive policies to correct external balance disequilibrium. Furthermore, an examination of exchange rate since 1986 suggests a tendency towards continuous exchange rate depreciation or misalignment. The impact of fluctuations in the nominal or real exchange rate necessitated government policy response through various modifications on the institutional framework and management strategy to achieve the objectives of exchange rate policy by intervening in the foreign exchange market to stem the tide of fluctuations of the exchange rate. Following the adoption of flexible exchange rate regime in 1986, some strategies were design by the government to address the problem of misaligned exchange rate is as follows;

The second-tier foreign exchange market (SFEM) was introduced in 1986. The SFEM comprises the first-tier and second-tier exchange rate was merged into a unified foreign exchange market (FEM) on July, 2nd 1987. However, foreign exchange market apparently did not produce a satisfactory result which led to its abandonment in 1994 (Jimoh, 2004).Interest rate were re-fixed at a maximum of 21 per cent, and the exchange rate fixed at N22 per US dollar (NDIC, 1994). The fixed exchange rate regime was abandoned shortly. The foreign exchange market was later

liberalized in 1995 with the introduction of autonomous foreign exchange market (AFEM) for the sale of foreign exchange to end users by the Central Bank of Nigeria through the authorized dealers at the market determined exchange rate. With the failure of AFEM, an inter-bank foreign exchange market was introduced in October 25th 1999. The design of IFEM was a two way quote system with the objective of diversifying the supply of foreign exchange in the economy by encouraging the funding of the inter-bank operation from privately earned foreign exchange, also the IFEM aimed at assisting the naira to achieve a realistic exchange rate, just like other foreign exchange policy, IFEM failed to achieve its objective. The failure of IFEM were traced to; limited sources of foreign exchange supply, the persistence expansionary fiscal operation of the government and the attendant problem of persistent excess liquidity, heavy debt service burden, and speculative demand driven by uncertainties created by social and political unrest. This necessitated the introduction of the Dutch Auction System (DAS) to replace the IFEM in July 22nd 2002. The Retail Dutch Auction system was re-introduced (the RDAS was first introduced in 1987, and was later re-introduced in 1990) specifically to eliminate distortion, persistence excess demand pressure and the volatility that prevail in the market. The RDAS was abolished on the 19th February 2006 when it became very obvious that it has failed to achieve its set objective (Akanji, 2006). The Central Bank of Nigeria adapted the Wholesale Dutch Auction system (WDAS) on the 20th February 2006 as an improved framework for determining the exchange rate in the foreign exchange market (Aliyu, 2012).

The WDAS which subsisted until the first three quarter of 2013, was replaced in October same year with the retail dutch auction system (rDAS) to curtail the unwholesome practices by authorized dealers and curtail the demand pressure as well as volatility in the foreign exchange market (CBN, 2013). In evaluating the effectiveness of foreign exchange management strategies

adopted since 1986. The pre-SAP naira exchange rate has to a large extent experienced overvaluation. The naira overvaluation had its telling implications on the economy. Such implications include, making imports cheaper relative to domestic substitutes and exports relatively expensive and uncompetitive, culminating in the encouragement of the importation of various items on a large scale at the expense of discouraging exports. It also encouraged capital flight and made for the dependence of the manufacturing sector on imported inputs. In recognition of these implications, the overvalued local currency became propped up by a pervasive system of exchange control which was not easy to administer while breeding various corrupt practices which undermined its usefulness (Campbell, 2010). The exchange rate policy adopted during SAP produce a more appropriate naira exchange rate which was evident in the key indicators of the economy. The value of non-oil export averaged ₦2.7 Billion between 1987 and 1989 was nearly six times the average value between 1984 and 1986. The upward trend observed since 1986 was sustained up to 1989. Overall balance of payment position has gradually improved since SAP with a consequent positive impact on the foreign exchange reserve; of special significance was the large increase in official reserve from ₦3.3 Billion in 1988 to ₦13.8 Billion in 1989, a value equivalent to 3.8 months of import compared to 1.3 month of import in 1988. Although it was evident that the naira has moved towards a more appropriate level since SAP, the instability of the market rate has been a concern to the authorities. For instance the naira exchange rate depreciated by 20 percent at the end of 1987 compared with the level at the end of 1986. By December 1988, the rate depreciated further by 22.7 percent, while it depreciated by another 30 percent at the end of 1989.

The major effects have been increased cost push inflation, speculation and its unconduciveness to planning. Expansionary monetary and fiscal policies which fuelled demand pressures in the midst of perennial supply bottleneck have been important in the high domestic inflation. During the one

year period ending February, 1990, the naira exchange rate depreciated by only 3.9 percent. Also the parallel market premium has been reduced substantially, it increase from 9.4 percent at the end of 1987 to 56.1 percent at the end of 1988, but narrowed to 24.0 percent in December 1989 and 12.8 percent in March 1990, (Ojo, 1990). Post-1994, saw a regulated regime, where interest rate were re-fixed at a maximum of 21 percent and the exchange rate at N22 per US dollar (Jimoh, 2004). In 1995 FEM was partially deregulated with the re-introduction of AFEM. Critical review of the performance of exchange rate shows that, there was sharp depreciation of the rate initially in January, 2000; and thereafter it became relatively stable. Thus, the naira exchanged at the rate of N102.10: $1 in 2000, depreciated to N111.96:$1 in 2001. As at 2002 and 2004, the exchange rate moved to N121.0:US:$1.00 and N133.5:US$1.00 respectively. For the first time in 2005, the naira exchange rate appreciated by 1.0 and 2.7 per cent over its previous levels at end 2004 and 2005 to N132.2 and N128.65 ≡ US$1 respectively. This according to CBN (2008) was as a result of a combination of factors which included among other. By the end December, 2006, the premium marginally fell short of the internationally acceptable limit of 5.0 per cent by only 0.08 per cent. Further appreciation was witnessed by up to 2.2 percent in 2007, that is from N128.65 ≡ US$1 in 2006 to N125.83 ≡ US$1. In similar fashion, at the Inter-bank and BDC segments of the market, the naira appreciated by 2.3 and 7.6 per cent to N125.75 and N127.41 per dollar.

The average of the naira for 2008 at the wDAS appreciated by 5.8% over the level in 2007 to ₦118.92 per US Dollar. The appreciation was recorded in January to October, however, the end-period exchange rate at the official window stood at ₦132.56 per Dollar, a depreciation of 11.0% compared with the level in 2007 (CBN, 2008). In 2010 exchange rate to the US Dollar was relatively stable, the average exchange rate of the naira at the wDAS segment of the forex market in 2010 was ₦150.30 per US Dollar, a depreciation of 0.9%, compared with the level in 2009

(CBN, 2010). Due to increase in capital inflows and intervention by the central bank the exchange rate of the naira at the wDAS/rDAS showed that it strengthen against the US Dollar by 0.1 per cent to ₦157.31 per US Dollar in 2013. Trend analysis of the monthly performance of exchange rate in all the segment of the market showed an average appreciation of 0.2% over the level in December 2012. In July 2013, the exchange rate depreciated to ₦157.32/US$ at the wDAS segment following a surge in the demand for forex induced by dividend repatriation and low activities at the interbank segment of the market. To curb this pressure, the bank re-introduces the rDAS in October, 2, 2013 to restore market stability. However, the rate at the BDC steadily depreciated from an average of ₦162.28/US$ in August to ₦171.40/US$ in December 2013.

The average exchange rate was relatively stable from January till October 2014 in all the three segment of the foreign exchange market. Thereafter, the market witnessed volatility as a result of severe pressure in the market. To mitigate the situation, central bank introduce some reforms on November 25, 2014 which included the adjustment of the mid-point of the official exchange rate from ₦155/US$ to ₦168/US$ and the widening of exchange rate band by 200 basis point from $\pm 3\%\ to\ \pm 5\%$. The annualized average exchange rate of the naira to the US Dollar at the rDAS segment depreciated by 0.8%, from the level in 2013 to ₦158.55/US$. Similarly at the interbank and BDC segments, the naira depreciated by 3.4% to ₦164.88/US$ and by 5.3% to ₦171.45/US$, respectively in 2014.

Development in the external sector reveals that periodic current account deficit characterized Nigeria's balance of payment profile from 1981 to1983. Statistically it deteriorated from 3.9984 billion (4.23% of GDP) in 1981 to 3.1379 billion (0.37% of GDP) in 1983. This is the result of the negative oil price shock of the early 80s. Specifically, the oil price shock of 1982 and the response of the government to sustain the importation of manufactured and intermediate goods led to huge

current account and balance of payment deficit. The subsequent short and medium term borrowing to sustained import led to a huge debt backlog creating the problem of debt service obligation.

The policy response of exchange controls and restriction[3] aimed at reducing the outflow of foreign exchange was inadequate in dealing with the current account deficit problems emanating from excessive domestic absorption. The enactment of the Economic Stabilization Act in 1982 and the National Economic Emergency Act in 1985 was an attempt to solve the problem of excess absorption by reducing the level of domestic aggregate demand. The following 2 years (1984-1985) recorded a current account surplus at an average of ₦1.13 billion (equivalent to an average of 1.01% of GDP). During the period 1986-1988, the current recorded continuous deficit on a year-on-year basis. However, surplus was recorded consecutively for the following four years, 1989-1992, this was due to positive development in the international oil market[4]. This was followed by periods of deficit from 1993-1995 with a cumulative average of ₦85.9593 billion and a range of 1.79% to 6.40% of GDP, the deficit recorded within this period is as a result of slowdown in global oil demand, fall in domestic output as a result of fall in domestic output due to supply disruption and strike by oil workers. However from 1996 to 2014 only two episodes of deficit was recorded which were in 1998 and 2002 respectively, the remaining periods were characterize by current account surplus. Although, there was remarkable decline in the current account surplus from 2006 to 2014, despite previous reform, especially SAP, the Nigerian economy seemed to be dictated by development in the international oil market which is indicative of the non-diversified nature of the economy.

[3]Exchange control and restriction created vent for rent-seeking, smuggling, corruption. In addition to heightened impediment to trade, the pervasive nature of the exchange control mechanism introduced serious distortion into the economy that greatly affected its performance in the subsequent years that follows.

[4]The oil price increase recorded during this period is due to 1990-1991 Gulf war.

Monetary management pre and post SAP relied on direct controls of reserves and interest rates structure of banks. The Nigerian economy witnessed financial repression as a result of rigid exchange and interest controls resulting in low direct investment and sluggish movement in monetary and credit aggregates. In response to these developments, the government deregulated interest rate in 1987 as an integral part of the structural adjustment program (SAP) policy package. The central argument behind the interest rate liberalization is that, it would provide sufficient funds for domestic investors, especially manufacturers who are seen as the prime movers of the economy and by extension engine of economic growth. However, in 1993, an important reform of the monetary management strategies was the introduction of open market operations (OMO). OMO became the dominant instrument of liquidity management complimented by reserve requirements and discount window operations Enyioko (2012). January 1994 witnessed another policy summersault, as the government introduced some measure of regulation into the interest rate regime. The argument was that there were wide variation under the completely deregulated regime, as a result government set deposit rate at 12%-15% per annum while a ceiling of 21% per annum was set for lending, pegged minimum rediscount rate at 13.5%, while the spread between saving and lending rates was expected not to be more than 7.5%.

2.6.2 Interest Rate Policy

The government adopted the policy of total deregulation of interest rate by October, 1996 due to the fact that the controls introduced in 1994 and 1995 had negative economic effects (Siyanbola, Sobande & Adedeji, 2012). As a result of the total deregulation of interest rates in 1996, Udoka & Anyingang (2012) noted that banks were given freedom to determine the structure of interest rates in consultation with their customers. The CBN, however, retained the discretionary power to intervene in the money market to ensure orderly developments in interest rates (Udoka

&Anyingang, 2012). The deregulation of interest rates brought in liquidity glut, high interest rates and volatile inter-bank interest rates which became a permanent feature in the Nigerian economy Edirin and Ekwueme (2015). However, the deregulation policy on interest rate was retained in 1997 (Akingunola, Adekanle and Ojodu, 2012). In other to bring moderacy on the rate of interest charged, which was considered too high due to deregulation, the CBN reached a tripartite agreement in October, 2002 on interest rate moderation with the banks operating in the country. In that agreement, a decision was reached to lower interest rate to a point where lending rates would not exceed 4% above the MRR (Ayodele, Obafemi & Akongwale, 2013).

A new monetary policy implementation framework was introduced in December 2006 to: remove the volatility in inter-bank rates, encourage interbank trading and engender a transaction rate that would improve the transmission of monetary policy actions. Consequently a new anchor interest rate referred to as the Monetary Policy Rate (MPR) replaced the Minimum Rediscount Rate (MRR) as a cornerstone of monetary policy implementation. The MPR was fixed at 10.0 per cent with a band of 600 basis point range. The deposit money banks availed themselves of the CBN standing facilities with surplus funds deposited at 7.0 per cent (300 basis point below the MPR), while those that were short of funds borrowed at 13.0 per cent (300 basis points above the MPR) CBN, 2006.

In view of the challenges facing the Nigerian economy, the Monetary Policy Committee (MPC) met in September 2013 with the view to reviewing economic development in the country (CBN, 2013). The result of the meeting was the fixing of the benchmark rate (MPR) at 12 per cent with an asymmetric corridor of +/- 200bps. Cash Reserve Ratio (CRR) on private sector deposits stood at 12 percent, while that of public sector deposit was 50 percent. Liquidity ratio was fixed at 30 percent of total assets, while Net open position of 1.0 percent of shareholders' funds was

maintained (CBN, 2013). The Bank maintained that interest rate in Nigeria averaged 9.55 Percent from 2007 until 2013, reaching an all-time high of 12 per cent in October, 2011 and a record low of 6 per cent in July of 2009. The average savings deposit rate rose by 1.21 per cent point to 3.38 per cent, while other rates of various maturities ranged between 4.63-9.89 per cent in 2014, from a range of 4.86-6.50 per cent in 2013. Similarly, the average term deposit rate rose by 1.83 per cent point to 8.50 per cent in 2014. Overall, the prime lending rate ranged between 15.88 and 16.95 per cent, while the prime lending rate ranged from 25.07 to 26.07 per cent in the review period (CBN, 2014).

The wide gap between lending and deposit rates in Nigeria is dominantly explained by: the depth of financial markets, level of inflation, risks and uncertainty. The low deposit rate compared to lending rate discouraged saving mobilization and the channeling of the mobilized savings through the system. This may lead to low savings, low investment and slower growth rate. Especially, as the resulting low interest rate cannot keep pace with rising price level, it results to negative real interest rate which discourages savings.

2.6.3 Money Supply and Inflation

According to Jhingan (2006), the supply of money at any moment is the total amount of money in the economy at a point in time. There are two broad definition of money supply, the narrow money (M1) and the broad money (M2), in Nigeria, the narrow money supply (M1) is defined as currency outside bank plus demand deposits of commercial banks plus domestic deposits with the central banks less Federal Government deposits at commercial banks, while broad money (M2) is defined as M1 plus quasi money. Quasi-money as used here is defined as the sum of savings and time deposits with commercial banks (Ebele and Akinkpelumi, 2015). However, Ajayi (1978) contends that M2 is the appropriate definition of money in Nigeria.

The effect of money on the real economy has always been of great concern to economists and policymakers. The theoretical link between money supply and inflation constitute the backdrop for the quantity theory of money. This theory has since the 16th century been used to explain the relationship between money supply and inflation. It states that there is a direct relationship between the quantity of money in an economy and the level of prices of goods and services sold.

One of the key problems that have confronted the monetary authority over the last few decades is curbing inflationary pressures. However, despite the various monetary regimes that have been adopted by the Central Bank of Nigeria over the years, inflation still remains a major threat to Nigeria's economic growth. Nigeria has experienced high volatility in inflation rates. According to CBN (2010), close examination of the long-term pattern reveals the following secular swings: 1965-1968 Rapid Declines (Civil War Years), 1969-1971 Revival, 1972-1980 Boom, 1981-84 crash, 1985 – 1991 Renewed Growth, 1992-2010 Wobbling. For instance, Since the early 1981, there has been three major episodes of high inflation in excess of 50 percent (from 57.2 percent in 1993, it fell slightly to 57.0 percent and rose to 72.8 percent in 1995). The failure of the monetary policy in curbing inflationary pressure has caused growth instability as Nigeria's record of growth and development has been very poor.

The growth of money supply is correlated with this high inflation episode because money growth was often in excess of real economic growth. This is evident in Table 2.4 were growth rate of GDP is seen to be negatively correlated to money supply as well as inflation. The positive correlation between inflation and money supply suggest that movement in money supply is a critical factor in the inflation process in Nigeria. From 1982-1984 negative growth trend was recorded as broad money supply (M2) increase from 9.09 percent in 1982 to 13.67 percent in 1984, inflation rose as well rose from 7.70 percent in 1982 to 39.60 percent in 1984. From Table 2.5, it can be seen that

the annual average growth rate depicted a similar pattern. For instance, the average annual growth rate of money supply from 1982-1986 was 10.49 percent, the average of GDP and inflation were 0.70 percent and 16.28 percent respectively. Subsequently, the increase in the annual average annual growth rate of money supply to 26.48 percent leads to increase in inflation to 21.98 percent, although, average annual growth rate grew marginally by 5.08 percent which later fell tom 2.25 percent from 1992-1996 within the same period average annual growth rate of money supply grew to 36.12 percent while inflation increase to an all-time average of 52.16 percent. Similar trends were obtained for periods up till 2014. For instance, average annual growth rate of money supply fell from 27.25 percent to 13.29 percent from 2007-2011 and 2012-2014 respectively; similarly, inflation fell from 11.44 percent to 10.00 percent. The descriptive statistics also shows some remarkable pattern.

Table 2.4 Correlations Coefficient of GDP, Inflation, Interest Rate and Broad Money Supply (M2)

	GDP	INFR	IR	M2
GDP	1.000000	-0.266514	0.255267	-0.012528
INFR	-0.266514	1.000000	0.316308	0.308185
IR	0.255267	0.316308	1.000000	0.332645
M2	-0.012528	0.308185	0.332645	1.000000

Table 2.5 Annual Average Growth Rate of M2, GDP, IR, Inf Rate, REER, CAGDP and NOILX

	m2	Gdp	IR	INF R	REER	CAGDP	NOILX
1982-1986	10.49	0.70	10.50	16.28	0.66	-2.39	0.29
1987-1991	26.48	5.08	21.26	21.98	-20.21	3.64	0.96
1992-1996	36.12	2.25	21.81	52.16	17.22	0.38	0.54
1997-2001	30.12	3.30	17.89	10.10	-1.97	2.62	0.55
2002-2006	25.04	6.66	19.99	13.60	3.62	16.48	0.92
2007-2011	27.25	6.96	16.93	11.44	2.49	9.92	1.94
2012-2014	13.29	1.41	16.69	10.00	5.20	4.77	2.40

Sources: *CBN Statistical Bulletin (Various Issues), World Economic Outlook, 2016*

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The methodology for this study stems from the problem of the study, the study objectives and recent theoretical insights and empirical studies on the nexus between exchange rate misalignments, government policy and the macroeconomic impacts. The standard procedure for carrying out such analysis is the conceptualization of the nexus in the primary relation (exchange rate misalignments and government policy) and the secondary relation (macroeconomic impacts). Second is the formalization of the relationship in the form of theoretical and empirical models and third, the implementation of the empirical analysis.

The methodology for this study is organized into two subsections; conceptual and theoretical framework and empirical framework.

3.2 Conceptual and Theoretical Framework

3.2.1 Conceptual Framework: Exchange Rate Misalignment

The debate about the macroeconomic impact of exchange rate misalignment has centered on its impact on external sector variables, manufacturing investment, growth, monetary aggregate and government fiscal stance. This can be grouped into three components as is evident in the flow chart (See Figure, 1). (a) The impact of policy on misalignment (b) the impact of exchange rate misalignment and policy on macroeconomic variables (c) the impact on growth through overvaluation and undervaluation.

The primary relation which is the misalignment – government policy nexus shows the impact of misalignment on economic growth through the policies of transmission channels (interest rate,

exchange rate and price level). The production channels refer to the mechanisms through which exchange rate misalignment affect the structure of production, output and productivity growth and capacity utilization and finally economic growth. In conceptualizing the growth effect of exchange rate misalignment, there are two divergent views. The first view is often referred to as 'Washington Consensus view' which posits that the value of a currency should be set at a level that is consistent with both internal and external balances. In other words, both overvaluations and undervaluation are inimical to growth (Edwards, 1989; Williamson, 1990). The second view emanated from the tremendous success recorded in the last few years by China and other East Asian countries and the ensuing debate about the undervaluation of the Chinese Renminbi brought into sharp focus, the link between undervaluation and growth.

The link between overvaluation and growth is possible through the de-industrialization effect of overvaluation and the collapse of agricultural sector leading to much dependence on commodity exports (the Dutch disease channel). The distributional channel work through the changing pattern and structure of aggregate demand and government expenditure, government policies whether fiscal which includes; revenue policy, expenditure policy, deficit financing, public debt etc trade policy or monetary and exchange rate policy play a key role in shock transmission in a small open economy like Nigeria. The overvaluation-growth nexus is also possible through its effect on precipitating inflationary pressures which has long term effect on competitiveness. For instance, if domestic non-tradable prices increase faster than foreign tradable prices, the real exchange rate will appreciate thereby stalling international competitiveness of domestic tradable as a result of decline in export. The resulting increase in imports will ultimately lead to nominal depreciation of domestic currency. It follows that nominal exchange rate is inversely related to foreign prices (Lane, 1999).

In the literature, the transmission channel linking undervaluation and growth operates through two channels. These include; the total factor productivity channel and the capital accumulation channel (Mbaye, 2013). The first channel – known as the "capital accumulation channel"– refers to the claim that real exchange rate undervaluation enhances growth through an increase in the stock of capital in the economy. There are two mechanisms through which capital accumulation enhances growth. In the first mechanism, the capital accumulation operates exclusively in the tradable goods sector –whose share in GDP increases (Rodrik, 2008) – while in the second, the stock of capital increases through the expansion of overall savings and investment (Levy Yeyati and Sturzenegger, 2007; Bhalla, 2008). The second transmission channel of the growth-undervaluation nexus is the "total factor productivity (TFP) growth channel"– places the structure of domestic production at the core of the analysis. A depreciated real exchange rate, equivalent to an increase in the price of tradable goods relative to non-tradables, improves the profitability of the tradable sector. As production responds to the price incentive and moves from the non-tradable to the tradable sector, the overall productivity in the economy increases leading to a booming export sector which ultimately fosters growth.

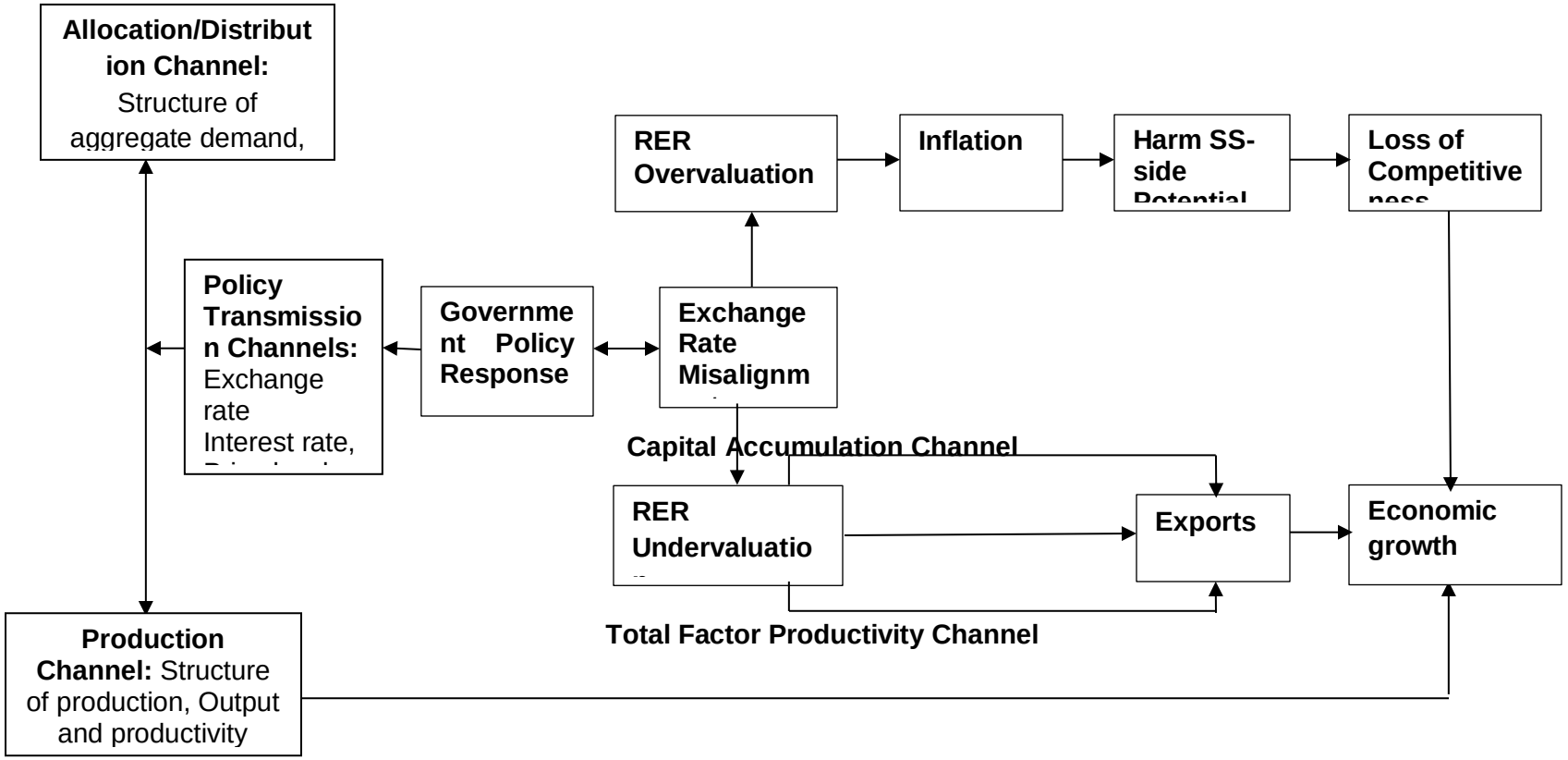


Figure 1: Flow Chart Showing Policy Transmission, Exchange Rate Misalignment-Growth Nexus.

Source: Designed by the author after consulting literature

3.3.0 THEORETICAL FRAMEWORK

In the modern theory the real exchange rate, RER is defined as the relative price of tradable goods (P_T) to non-tradable goods (P_N) i.e.,$EP_T^*/P_N$and uses a formal model for determining the RER (Tensay, 2006). Its key advantage compared to the traditional PPP is its ability to incorporate changes in the equilibrium real exchange rate and the calculation of the Fundamental Equilibrium Exchange Rate (Williamson 1994). However, despite this advantage, there is no consensus about the measure for the prices of tradable and non-tradable goods. The contending view is whether to use consumer price index (CPI) or world wholesale price index (WPI) to substitute price of non-tradable and tradable respectively or what such choice represents. For instance, Elbadawi (1994) and Edwards (1989) argued that WPI is a good proxy for the price of tradable and the CPI for that of non-tradable. Their reasoning is that WPI contains mainly tradable and CPI mainly nontradable (Tensay, 2006). This study utilized the method in (Coudert & Couharde, 2005) by considering relative price which is measured by dividing GDP in dollars by GDP in PPP, and then by the price level of the United States. Therefore, these relative price levels can be assimilated to deviations of the exchange rates to PPP. Another important question in the literature is the choice of nominal exchange rate. For instance, will the use of bilateral exchange rate with respect to the US Dollar suffice or the multilateral exchange rate of the trading partners and what weights and which country's currencies should be included in the multilateral exchange rate This study, in congruent with other empirical studies used the multilateral real exchange rate and trade weights with respect to some trading partners.

The theoretical framework used in this study is adopted from Edwards‘(1989) model of real exchange rate determination. The model captures most of the stylized features of a small open developing economy, including the existence of exchange (in form of fixed nominal exchange

rate), budget deficit and trade controls as key drivers of real exchange rate RER adjustment. This model allows only the fundamentals' or real variables to play a role in determining the long run equilibrium real exchange rate, whereas both real and nominal factors influence the actual real exchange rate in the short run. According to him, the important fundamentals that determine the real exchange rate are; the terms of trade, level and composition of government consumption, controls on capital flows, exchange and trade controls, technological progress, and capital accumulation. Various variants of the Edward (1989) model abounds in the literature, for instance, Aron et al (1997) and Mkenda (2001) included central bank reserve (CBR) and real money supply (M2) to the model of the real exchange rate to capture the role of macroeconomic policies. Besides, numerous econometrics methods were used to estimate the equilibrium exchange rate ranging from cointegration, OLS, DOLS, ARDL etc. This study used the four variables VAR which includes; oil price (op), relative output (y), real effective exchange rate (r) and relative prices (p).The SVAR model is utilized among the competing models in understanding the dynamics of real exchange rate because it has a better empirical fit and allows for greater identification of shocks that make economic sense. The SVAR model used for this study is based on the Blanchard and Quah, 1989 methodology. The empirical model should be estimated as a vector auto-regression model in first differences. Hence, defining $\Delta Xt \equiv (\Delta op, \Delta y, \Delta r, \Delta p)$ where the four variable VAR includes; oil price (op), relative output (y), real effective exchange rate (r) and relative prices (p) in which case four structural shocks can be identified; real demand shocks (η_D), nominal shocks (η_N), aggregate supply shocks (η_S) and oil price shocks (η_{OP}).

3.3.1 CORE ASSUMPTIONS

The core assumptions implicit in the conceptual framework represented graphically by figure 3.1 are as follows

i. Presence of supply shock in the economy

ii. Current output below its potential rate

iii. Exchange rate misalignment impact on government policy and on welfare

iv. Unemployment or underutilization of capacity in the economy

v. Exchange rate misalignment affects monetary aggregates (inflation, interest rate, exchange rate) which in turn affect aggregate demand and aggregate supply

vi. Structures of government expenditure and aggregate demand have effect on monetary aggregate which in turn impact on growth.

vii. There is Dutch disease syndrome in the economy.

3.3.2 Model 1: Fundamental Equilibrium Exchange Rate (FEER)

The FEER approach has different variants, which differ on the type and size of modeling (general equilibrium, partial equilibrium, reduced form relationship), on the determination of the sustainable current account in the medium term (econometric estimates, judgmental assessment, arithmetic average) and on the trade elasticities (calibration to balance the trade model in volume and value, econometric estimates in a panel setting to ensure consistency of the world trade model)[5]. However, the fundamental equilibrium exchange rate (FEER) is a normative measure of equilibrium RER as it involves some notion of "ideal" economic circumstances of internal and external balances. In particular, defining external balances, i.e., sustainable CA balance, tends to be controversial. In addition, to determine FEER, trade elasticity needs to be calculated to

[5] See Saadaoui (2015)

determine the response of exports and imports to relative price changes. Different forms of CA equations could lead to different values of the trade elasticity. Relying too much on trade elasticity may generate an inaccurate estimate of the FEER trajectory.

Therefore, the approach used in this work is a new alternative empirical methodology developed by Egert & Lahreche-Revil, (2003), which combines the fundamental equilibrium exchange rate (FEER) methodology with the behavioural equilibrium exchange rate (BEER) approach to estimate internal and external balances defined respectively in terms of the relative price of non-tradable goods and the long-run sustainability of the current account position. The empirical implementation is carried out in the framework of a VAR-based 3-equation cointegration system. Estimated long-term values for relative prices and the current account are then substituted in the simultaneously estimated relationships connecting the real effective exchange rate with relative prices and the current account (ibid).

The following cointegration vectors are estimated and respectively normalised to relative prices (RP), the current account (CA) and the effective real exchange rate (REER) as presented in eqn 3.1-3.3

Internal balance

$$RP + \beta_{11}RGDP + \beta_{12}PCONS + \beta_{13}GCONS \qquad 3.1$$

External balance

$$CA + \beta_{21}TOT + \beta_{22}OPEN + \beta_{23}OILB \qquad 3.2$$

Real effective exchange rate

$$REER + \beta_{31}RP + \beta_{32}CA \qquad 3.3$$

Were *RP* is the relative price define as the ratio of domestic *GDP* in *US*$ and *GDP (PPP)* standard over *US CPI, RGDP* stands for relative labour productivity against the basket of countries defined

as the ratio of domestic GDP per capita (PPP) standard and the US GDP per capita (*PPP*) standard, PCONS represents private consumption expenditure as percentage of *GDP*, *GCONS* represents government consumption expenditure as percentage of *GDP*; CA is the current account as a percentage of *GDP*, *TOT* is the terms of trade, and OPEN is the openness ratio of the country defined as *X+M* over *GDP*, *OILB* is the oil balance as a percentage of *GDP*. All variables are transformed to natural logarithms. *REER* is the CPI-based real effective exchange rate.

In a small open economy, internal balance is reached when the relative price of non tradables (RP) clears the market. Hence, relative prices reflect the internal balance as define in equation 1. They are determined by relative productivity (RGDP) and demand (which comprises both private and government consumption expenditure). An increase in the Nigeria's relative productivity will strengthen economic activity and may boost wages, which could result in increase in relative price through demand upsurge in the non-tradable sector. An increase in both private and government consumption should also result in an increase in relative prices, if it falls mostly on non-tradable goods.

External balance is reached when the current account (CA) is sustainable. Current account equilibrium depends on structural factors, with the terms of trade (TOT) being the main one in a small open economy. The competitiveness effect could be measured using two different indicators: real effective exchange rates and terms of trade. The HLM effect – from the names of the three economists who highlighted it Harberger, (1950) Laursen and Metzler, (1950) – implies that an improvement in the terms of trade generates an increase in the current account balance. This effect is explained by the following mechanism: improvement in the terms of trade of a small open economy increases its real income and if one assumes that the propensity to consume is less than one, consumption increases less than income — which means that it has a positive impact on the

current account balance by boosting private savings. However, an improvement in terms of trade (TOT) can have an ambiguous effect (Egert & Lahreche-Revil, 2003). On one hand, it increases the value of exports relative to imports, and for a given trade volume, improves the current account in value. On the other hand, if it is translated into a worsening of export competitiveness, it can also have a volume effect. The volume of exports shrinks and the current account in value can deteriorate

Another significant factor identified in the literature as an important determinant of current account is oil price. The inter-temporal approach to the balance of payments predicts that under perfect capital mobility, a temporary oil-price shock should result in transitory external imbalances, and a permanent shock should be compensated by internal adjustment. As a result, we expect either a positive relationship or a non-significant one, depending upon whether or not the oil shock is offset by the non-oil trade balance (Kilian et al., 2007). Thus, the impact of oil price fluctuations is measured through the OILB variable, which is measured as the percentage of oil balance to GDP. We expect a positive effect of the oil balance on the current account.

Openness (conventionally measured by the sum of imports and exports as a share of GDP) is traditionally used as proxy for liberalization. An increase in openness, inasmuch as it stems from trade liberalization, and therefore cuts in tariff and non-tariff protection, should worsen the current account, because it generates an increase in imports.

In the third relationship, both the internal and the external balance contribute to the determination of the real exchange rate. In other words, a rise in the relative price of non tradables should be associated with a real appreciation; whilst a worsening of the current account should, to the contrary, produce a real depreciation.

3.3.3 Model 2: Structural Vector Autoregressive Model (SVAR)

The SVAR model is utilized among the competing models in understanding the dynamics of real exchange rate because it has a better empirical fit and allows for greater identification of shocks that make economic sense. Compared to other models, the kind of SVAR model used for this study is based on the Blanchard and Quah, 1989 methodology. Where variables in the model attain their stationarity at first difference, the empirical model should be estimated as a vector auto-regression model in first differences. Hence, defining $\Delta Xt \equiv (\Delta op, \Delta y, \Delta r, \Delta p)$ where the four variable VAR includes; oil price (op), relative output (y), real effective exchange rate (r) and relative prices (p) in which case four structural shocks can be identified; real demand shocks (η_D), nominal shocks (η_N), aggregate supply shocks (η_S) and oil price shocks (η_{OP}). By employing a matrix of polynomial in the lag operator following Meurers, (2006) gives the following expression

$$L: B(L) = B_0 + B_1L + B_2L^2 + \ldots., \qquad 3.4$$

The reduce form of the VAR which has to be estimated can be expressed as

$$B(L)\Delta X_t = \varepsilon_t \quad 3.5$$

Where $var(\varepsilon_t) = \Omega$ is the corresponding variance –covariance matrix of the error term. This VAR can be inserted into the following moving average representation:

$$\Delta X_t = D(L)\eta \qquad 3.6$$

where $C(L)D_0=D(L)$, the η_t 's are normalized so that they all have unit variance. If D_0 is identified, the MA representation of eqn.3.6 can be derived. Since D_0 is a (4*4) matrix with 16 elements. If the model above actually generated the data, then the four variable endogenous variables depends on four types of structural shock which includes; demand shock (η_D), supply shock (η_S), nominal shock (η_N), and oil price shock (η_{OP}). However, a four variable system imposes ten restriction on

the system imposed ten restrictions on the elements in D_0 , six more restrictions are then needed to identify D_0, which will be achieved from restriction on the long run multipliers of the *D(L)* matrix. The long run expression of eqn. 3.6 can simply be written as

$$\begin{bmatrix} \Delta_{OP} \\ \Delta_Y \\ \Delta_R \\ \Delta_P \end{bmatrix} = \begin{bmatrix} D_{11}(I) & D_{12}(I) & D_{13}(I)\, D_{14}(I) \\ D_{21}(I) & D_{22}(I) & D_{23}(I)\, D_{24}(I) \\ D_{31}(I) & D_{32}(I) & D_{33}(I)\, D_{34}(I) \\ D_{41}(I) & D_{42}(I) & D_{43}(I)\, D_{44}(I) \end{bmatrix} \begin{bmatrix} \eta_{OP} \\ \eta_S \\ \eta_D \\ \eta_N \end{bmatrix} \quad 3.7$$

As Blanchard and Quah (1989) have shown, the restriction can be imposed on D_0 by a lower triangular Cholesky decomposition of the estimated long-run variance-covariance matrix $C(I)\Omega C(I)'$:

$$HH' = C(1)\Omega C(I)' \quad 3.8$$

Where H is a unique lower triangular matrix, the identification scheme utilized in this work is based on the standard open economy model as presented in (Bjornland, 2004).

First, the restriction that the nominal shock can have only short term effects on the real exchange rate is consistent with most models of short run exchange rate variability, but long run PPP (see Clarida and Gali 1994). In other words, PPP is preserved in the long run with respect to monetary changes, so that nominal shock will increase price and depreciate the exchange rate proportionally. Thus:

$$D_{34}(1) = 0 \quad 3.9$$

Second, the key (long run) identifying assumption that distinguishes between the demand and supply shocks, asserts that in the long run, the level of production will be determined by supply side factors (aggregate supply and real oil price shocks) only (see Blanchard and Quah, 1989). However, in the short run, due to nominal and real rigidities, all four disturbances can influence production. Hence:

$D_{23}(1)=D_{24}(1)=0$ 3.10

Finally, the oil price shock itself is identified as the only shock that can have a long run effect on the real oil price. However, in the short run, all shocks are allowed to influence real oil prices:

$D_{12}(1)=D_{13}(1)=D_{14}(1)=0$ 3.11

However, close examination of the impulse response function will reveal some over identifying restriction based on the standard IS-LM framework. For instance, a positive real demand and nominal shocks (that increase production only temporarily) shall increase price permanently. With these six long run restrictions, the matrix *D(I)* will be lower triangular that can be used to recover D_0. Finally, the resulting historical decomposition of ΔX_t into the time part generated by the individual structural shocks, are given by the following expression

Historical path generated by oil price shocks: $\Delta X_t = C(L)\begin{bmatrix} D_{11}\,\eta_{OP} \\ D_{21}\,\eta_{OP} \\ D_{31}\,\eta_{OP} \\ D_{41}\,\eta_{OP} \end{bmatrix}$

Historical path generated by supply shocks; $\Delta X_t = C(L)\begin{bmatrix} D_{12}\,\eta_S \\ D_{22}\,\eta_S \\ D_{32}\,\eta_S \\ D_{42}\,\eta_S \end{bmatrix}$

Historical path generated by demand shocks; $\Delta X_t = C(L)\begin{bmatrix} D_{13}\,\eta_D \\ D_{23}\,\eta_D \\ D_{33}\,\eta_D \\ D_{43}\,\eta_D \end{bmatrix}$

Historical path generated by nominal shocks; $\Delta X_t = C(L)\begin{bmatrix} D_{14}\,\eta_N \\ D_{24}\,\eta_N \\ D_{34}\,\eta_N \\ D_{44}\,\eta_N \end{bmatrix}$

3.3.4 Model 3: Natural Equilibrium Exchange Rate (NATREX) Bound Testing Approach

The use of the bounds technique is based on three validations. First, Pesaran *et al*. (2001) advocated the use of the ARDL model for the estimation of level relationships because the model suggests that once the order of the ARDL has been recognised, the relationship can be estimated by OLS. Second, the bounds test allows a mixture of I(1) and I(0) variables as regressors, that is, the order of integration of appropriate variables may not necessarily be the same. Therefore, the ARDL technique has the advantage of not requiring a specific identification of the order of the underlying data. Third, this technique is suitable for small or finite sample size (Pesaran *et al*., 2001). In addition to these, the short run equilibrium (error correction model (ECM)) can be derived from the ARDL through a simple linear transformation, which integrates short run adjustments with the long run equilibrium without loss of long-run information.

The building blocks for the ARDL approach constitute two steps: First the long-run relationship (cointegration)[6] among all variables must be established and two, the long-run coefficients and the short-run coefficients are jointly estimated using the associated ARDL and error correction models (ECM).

According to Pesaran et al. (2001) the approach begins with an assemblage of the Vector Auto-regression (VAR) of order *p,* denoted VAR (*p*):

$$Z_t = \mu + \sum_{i=1}^{p} \beta_i z_{t-i} + \varepsilon_t \quad \text{.....3.12}$$

[6]Cointegration as a long run relationship between variables may be expected to exist only when the system is in a steady state (Ford 1997).

z_t is a vector of both x_t and y_t, where y_t represents the dependent variables of the different models, x_t is the vector matrix which represents a set of explanatory variables. Where y_t is the dependent variable defined as real effective exchange rate (reer), x_t is the vector matrix which represents a set of explanatory variables i.e., terms of trade (tot), government consumption expenditure (gcons), relative productivity (rgdp), child dependency ratio (depy) and aged dependency ratio (depo). According to Pesaran *et al*. (2001), y_t must be I(1) variable, but the regressor x_t can be either I(0) or I(1). The ARDL model sued in this study is expressed as follows;

$$\Delta(reer)_t = \beta_0 + \beta_1(rgdp)_{t-1} + \beta_2(gcons)_{t-1} + \beta_3(tot)_{t-1} + \beta_4(depy)_{t-1} + \beta_5(reer)_{t-1} + \sum_{i=0}^{r} \beta_6 \Delta(rgdp)_{t-i} + \sum_{i=0}^{r} \beta_7 \Delta(gcons)_{t-i} + \sum_{i=0}^{r} \beta_8 \Delta(tot)_{t-i} + \sum_{i=0}^{r} \beta_9 \Delta(depy)_{t-i} + \sum_{i=0}^{r} \beta_{10} \Delta(reer)_{t-i} - - - - - - - - - - - - - - - 3.13$$

The estimation of equation 3.13 tests for the existence of a long-run relationship among the variables by conducting an F-test for the joint significance of the coefficients of the lagged levels of the variables. The null and alternative hypotheses are as follows:

$H_0 = \beta_1 = \beta_2 = \beta_3 = - - - \beta i = 0$ (no long-run relationship)

Against the alternative hypothesis

$H_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 = - - - \beta i \neq 0$ (a long-run relationship exists)

The computed *F*-statistic value will be evaluated with the critical values based on Pesaran *et al.* (2001) table for critical values.

3.3.5 Model 4: Behavioural Equilibrium Exchange Rate (BEER)

The use of the bounds technique in the estimation of the BEER model is validated by the existence of the mixture of I(1) and I(0) variables as regressors, Pesaran *et al*. (2001), that is, the order of

integration of appropriate variables may not necessarily be the same. Therefore, the ARDL technique has the advantage of not requiring a specific identification of the order of the underlying data. The building blocks for the ARDL approach constitute two steps: First the long-run relationship (cointegration) among all variables must be established and two, the long-run coefficients and the short-run coefficients are jointly estimated using the associated ARDL and error correction models (ECM). The variable OPV represents oil price volatility, OPP is openness, MPR is the monetary policy rate, GCONS represents government consumption, relative prices is RP, MPR is the monetary policy rate while R-R* represent the real interest rate differentials.

In this work, behavioural equilibrium exchange rate (BEER) approach identifies an estimated equilibrium relationship between the real effective exchange rate and economic fundamentals. Following (Clark & Macdonald, 2004), the economic fundamental are decomposed into transitory and permanents, with the later used to estimate the permanent equilibrium exchange rate (PEER).

$$\begin{aligned}\Delta(reer)_t = {} & \beta_0 + \beta_1(opv)_{t-1} + \beta_2(opp)_{t-1} + \beta_3(mpr)_{t-1} + \beta_4(gcons)_{t-1} + \beta_5(nfa)_{t-1} \\ & + \beta_6(tot)_{t-1} + \beta_7(rpro)_{t-1} + \beta_8(r - r*)_{t-1} + \beta_9(reer)_{t-1} \\ & + \sum_{i=0}^{r} \beta_{10}\Delta(opv)_{t-i} + \sum_{i=0}^{r} \beta_{11}\Delta(opp)_{t-i} + \sum_{i=0}^{r} \beta_{12}\Delta(mpr)_{t-i} \\ & + \sum_{i=0}^{r} \beta_{13}\Delta(gcons)_{t-i} + \sum_{i=0}^{r} \beta_{14}\Delta(nfa)_{t-i} + \sum_{i=0}^{r} \beta_{15}\Delta(tot)_{t-i} \\ & + \sum_{i=0}^{r} \beta_{16}\Delta(rpro)_{t-i} \\ & + \sum_{i=0}^{r} \beta_{17}\Delta(r - r*)_{t-i} + \sum_{i=0}^{r} \beta_{18}\Delta(reer)_{t-i} ----3.14\end{aligned}$$

The apriori expectation following Clark and Macdonald (2004), (Macdonald, 2003) is presented below

$$REER = f(\underset{nfa,}{+} \quad \underset{tot,}{\pm} \quad \underset{opv,}{+} \quad \underset{mpr,}{+} \quad \underset{opp,}{-} \quad \underset{rpro,}{+} \quad \underset{r-r*}{+}) \quad \text{----------3.15}$$

3.3.6 Non-Oil Export and Exchange Rate Misalignment

The high oil intensity that characterized the Nigerian economy, the issue is whether the dominant role of oil is related to the sluggish performance of the non-oil sector. In other words, is the high level of oil exports (possibly due to high world oil prices) dampens Nigeria's willingness to export non-oil products in the short-term period. Non-oil export firms are often diversified enterprises that also produce goods and services for the local oil sector. During periods of high world oil prices, the non-oil export sector may gain more from activities that directly service the oil sector than in the production of non-oil export goods, leading to decline in the activities of the non-oil sector in the short run. This short term decline in the activities of the non-oil sector can be conceptualized as a 'Dutch Disease' phenomenon following the work of Anaman and Mahmod, (2003). The 'Dutch Disease' syndrome is captured by the oil to GDP ratio. For relatively large-sized open economies, the real effective exchange rate is considered an important determinant of the level of export demand together with real foreign income (Hongwei and Zhen 2001). Anaman and Mahmod, (2003) examined factors influencing exports of non-oil products from Brunei Darussalam from 1961 to 2000. By employing cointegration technique to identify the significant factors affecting levels of non-oil exports, the factors considered includes real wages, level of oil exports as a proportion of gross domestic product, government exports promotion policy, and trend factors, such as improvement in infrastructure.

A short run dynamic model is required for the estimation of the nexus between misalignment series (*MSALSVAR*) and non-oil export (*X*). We specified an error correction term for the non-oil export

equation following Engle and Granger procedure by using the one period lag of the residuals from their estimated long run equation as the error correction term (ECT_{t-1}). We allow for up to 4 lags for all the variables, and included dummy. Firstly, we estimated a general form of the form

$$a(L)\Delta InX = b(L)\Delta Z + \theta.ECM_{-1} + \mu \qquad \textbf{3.16}$$

Where X represent non-oil export, Z is a vector of predetermined and exogenous variables which includes ($reer, fdi, ep, oilgdp, misal$) *reer* represent the real exchange rate, fdi is foreign direct investment, ep represent infrastructure proxied by electricity production, oilgdp implies oil to GDP ratio which is to capture the 'Dutch Disease' effect and ECM is the error correction term obtained from the residual of the long run static equation, μ is the disturbance term, θ is the adjustment parameter, $a(L)$ and $b(L)$ are the lag polynomials while Δ implies the first difference term. The estimation of equation 3.16 is done using General-to-Specific (GETS) procedure by successively excluding variables that are statistically insignificant using the variable deletion test.

3.3.7 Exchange Rate Misalignment and Economic Growth

The growth regression generally estimated for this study considers the commonly used growth determinants in most empirical work. For instance investment to GDP (see Mankiw et al., 1992): government consumption as a percentage of GDP (see Barro and Salai-i Martin, 1995): trade oppenness (see Edward, 1998) and terms of trade TOT.

$$Gr_t = \propto_0 + + \beta_1 INV_t + \beta_2 MISAL_t + \beta_3 OPP_t + \beta_4 TOT_t + \beta_5 GCONS_t + \mu_t \qquad \textbf{3.17}$$

Where $\propto_0$ is a constant and μ_t is a well behaved error terms

We can now specify equation 3.17 as a general dynamic equation called an autoregressive distributive lag (ADL) of order k as follows;

$$gr_t = \beta_0 + \sum_{j=1}^{k} \beta_{1j} gr_{t-j} + \sum_{j=0}^{k} \beta_{2j} inv_{t-j} + \sum_{j=0}^{k} \beta_{3j} misal_{t-j} + \sum_{j=0}^{k} \beta_{4j} opp_{t-j} + \sum_{j=0}^{k} \beta_{5j} tot_{t-j} + \sum_{j=0}^{k} \beta_{6j} gcon_{t-j} + \mu_t \quad \textbf{3.18}$$

By adding lag 1 through k of the dependent variable and all the independent variables to the original model, it is evident from equation 3.18 that the lag of the dependent variable start with lag j=1 while that of the independent variables start with j=0. The reason is because of the need to include the contemporaneous value as in equation 3.17 (Olubusoye and Oyamorade, 2009).

$$gr_t = \beta_0 + \sum_{j=1}^{k-1} \beta_{1j} gr_{t-j} + \sum_{j=0}^{k-1} \beta_{2j} inv_{t-j} + \sum_{j=0}^{k-1} \beta_{3j} misal_{t-j} + \sum_{j=0}^{k-1} \beta_{4j} opp_{t-j} + \sum_{j=0}^{k-1} \beta_{5j} tot_{t-j} + \sum_{j=0}^{k-1} \beta_{6j} gcon_{t-j} - \lambda(Gr_{t-1} - \emptyset_1 INV_{t-1} - \emptyset_2 MISAL_{t-1} - \emptyset_3 OPP_{t-1} - \emptyset_4 TOT_{t-1} - \emptyset_5 GCONS_{t-1}) + v_t \quad \textbf{3.19}$$

The term in the bracket represent the error correction term. The estimation of equation 3.19 is done using General-to-Specific (GETS) procedure by successively excluding variables that are statistically insignificant using the variable deletion test.

3.3.8 Current Account and Exchange Rate Misalignment

Based on theoretical underpinning, the most relevant determinants of current account, referring either to savings, or investment, or both, will normally include the stock of net foreign assets (NFA), government budget – both variables expressed in relative terms to GDP - relative income, terms of trade volatility and demographic variables (young- and old-age dependency ratios). However, the empirical model used to estimate the determinants of current account is based on (Lane and Milesi-Ferretti, 2012), we consider various explanatory variables of the current account: (i) the broad money supply as a ratio of GDP (m2gdp) (ii) the lagged net foreign asset position (nfa) expressed as percentage of GDP (iii) the real oil balance (oilb) (iv) the relative GDP growth rate (rgdp), (v) child dependency ratio (depy) (vi) fiscal balance (gcons) (vii) openness (opp). This is expressed in the following estimation

$$CA = \alpha_I + \beta_1 oilb_t + \beta_2 rgdp_t + \beta_3 depy_t + \beta_4 opp_t + \beta_5 gcons_t + \beta_6 m2gdp_t + \beta_7 nfa_t + \epsilon_t \quad ---------- 3.20$$

The aprio ri signs is stated below

$$(\underset{+}{oilb}, \underset{+}{rgdp}, \underset{+}{depy}, \underset{-}{opp}, \underset{+}{gcons}, \underset{-}{m2gdp}, \underset{+}{nfa})$$

First, the existence of long-run equilibrium relationships is tested using the bound testing approach to cointegration sinceitdoes not necessarily require any pre-testing the underlying series for unit root, in other words, it involves testing cointegration between the combination of I(0) and I(1) series. The second step is to estimate equation 3.20 using the fully modified OLS (FMOLS) to obtained the estimated value of current account and subsequently obtain the current account imbalance by subtracting the estimated current account from its current values.

The third step is to conduct Granger-Causality test, Granger causality tests is carried out on the basis of the findings from the cointegration analysis – in the context of a VAR or a vector error correction model (VECM) respectively, depending on whether cointegration does not or does hold. In the former case the model is the following

$$\Delta CAI_t = \alpha_1 + \sum_{i=1}^{k} \beta_{1i} \Delta CAI_{t-i} + \sum_{i=0}^{k} \varphi_{1i} \Delta MISAL_{t-i} + \varepsilon_{1t} \quad 3.21$$

$$\Delta MISAL_t = \alpha_2 + \sum_{i=1}^{k} \varphi_{2i} \Delta MISAL_{t-i} + \sum_{i=0}^{k} \beta_{2i} \Delta CAI_{t-i} + \varepsilon_{2t} \quad 3.22$$

where CAI_t is the estimated current account gap (current account imbalance) while $MISAL_t$ stands for the exchange rate misalignment series; Δ is the first difference operator; $\alpha_1$andα_2 are constant drifts; β_{ji} and φ_{ji} are polynomials of order k-1 and ϵ_{1t} andϵ_{2t} are the residuals. Failure to reject the null hypothesis of H_0: $\sum_{i=0}^{k} \varphi_{1i} = 0$ implies that exchange rate misalignment does not Granger-cause current account imbalance. Similarly, failure to reject the null hypothesis; H_0 :$\sum_{i=0}^{k} \beta_{2i} = 0$ implies that current account imbalance does not Granger-cause exchange rate misalignment.

CHAPTER FOUR

RESULT AND DISCSSION

4.1 Empirical Implementation

4.1.1: Augmented Dickey Fuller (ADF) and Phillips Peron (PP) Unit Root Tests

The standard Augmented Dickey-Fuller (ADF) and Philip-Perron unit root test was exercised to check the order of integration of these variables. The results obtained are reported in Table 4.1.

Table 4.1: Unit Root Test

Augmented Dickey Fuller Test					**Philips Peron Test**				
Variables	Levels		First Difference		Levels		First Difference		OOI
	With C	With C & T	With C	With C & T	With C	With C & T	With C	With C & T	
REER	-2.3841	-1.9800	-3.6817	-3.8461	-2.0844	-1.7381	-4.8310	-4.8636	I(1)
RGDP	-2.4861	-2.6124	-2.6659	-3.0504	-1.8773	-1.6055	-4.7374	-5.1077	I(1)
ROILP	-2.4454	-0.9762	-8.0695	-8.5349	-2.6560	-0.7822	-7.9776	-8.1450	I(1)
RP	-2.6529	-0.9388	-2.3774	-3.3210	-2.7221	-1.8277	-4.9477	-5.4137	I(1)
CAGDP	-2.1658	-2.2941	-3.0866	-3.1407	-2.4554	-2.6249	-5.2570	-5.2285	I(1)
GCON	-0.6391	-1.9152	-1.9992	-2.0579	-1.7289	-2.3456	-6.3595	-7.0983	I(1)
OILB	-2.0539	-2.4705	-3.7165	-3.7721	-1.9459	-2.5696	-5.7794	-5.7377	I(1)
OPP	-1.7603	-2.2525	-3.8320	-3.8730	-1.1741	-2.8112	-7.1950	-7.1205	I(1)
TOT	-0.9070	-2.7880	-3.6631	-3.5833	-1.3834	-2.1828	-5.3787	-5.2585	I(1)
PCON	-1.9790	-1.7414	-3.0240	-3.2811	-1.8401	-1.9307	-7.1847	-10.5783	I(1)
DEPO	-3.9165	--3.6445	-2.0233	-1.2126	-0.6137	-2.8005	-2.1387	-2.3711	I(0)
DEPY	-7.1616	-6.9523	-4.2118	-5.1295	-2.6842	-4.4163	-6.6967	-1.1437	I(0)
M2GDP	-1.7929	-2.4568	-3.4577	-3.4539	-1.8547	-2.2401	-5.3583	-5.3312	I(1)
R-R*	-3.0576	-3.9803	-6.2042	-6.1729	-2.2948	-2.9861	-13.7619	-13.6408	I(0)
FGDP	-0.7977	-2.3483	-3.8454	-3.8430	0.1512	-2.3254	-4.9886	-4.9250	I(1)
X	-1.8383	-2.5309	-3.9885	-4.0756	-1.8637	-2.4863	-5.7747	-5.7687	I(1)
MAGDP	-2.5632	-2.1817	-2.5000	-2.8513	-1.6547	-1.3683	-5.8139	-5.4777	I(1)

FDI	-2.5564	-1.6929	-3.9713	-4.1421	-2.6968	-2.6473	-7.4222	-8.5545	I(1)
GR	-3.0289	-4.7657	-9.1465	-9.1431	-13.9126	17.4219	-30.3701	-30.1659	I(0)
INV	-2.4281	-3.5485	-3.8893	-3.8602	-1.8257	-2.5004	-5.8152	-5.7524	I(0) & I(1)
MISAL	-7.2332	-7.1849	-	-	-12.3764	-12.3232	-	-	I(0)
CAI	-5.7411	-5.5642	-	-	-9.1465	-9.0987	-	-	I(0)

Note: T = trend, C = constant and OOI = order of integration. ADF test: 1 per cent =-3.654, 5 Per cent = -2.957: Philip Perron 1 per cent = 3.646, 5 per cent = -2.954

4.1.2 Model 1: Fundamental Equilibrium Exchange Rate (FEER)

To provide an empirical insight into the relationship between CA OILB OPP and TOT, a cointegration test is applied; the result is presented in Table 4.2. The Johansen test indicates the presence of no cointegration in the current account (external balance) specification which led to the estimation of an unrestricted VAR for the current account equation.

Table 4.2: Johansen Cointegration Test for CA OILB OPP TOT

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	*Eigenvalue*	*Trace Statistics*	*0.05 Critical Value*	*Prob. **
*None**	0.1782	42.6589	47.8561	0.1411
At most 1	0.0693	17.3397	29.7971	0.6149
At most 2	0.0380	8.0691	15.4947	0.4581
At most 3	0.0236	3.0744	3.8415	0.0795

Trace test indicates no cointegrating eqn(s) at the 0.05 level
**denotes rejection of the hypothesis at the 0.05 level*
***MacKinnon-Haug-Michelis (1999) p-values*

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	***Eigenvalue***	***Trace Statistics***	***0.05 Critical Value***	***Prob. ** **
*None**	0.1782	25.3192	27.5843	0.0948
At most 1	0.0693	9.2706	21.1316	0.8100
At most 2	0.0380	4.9947	14.2646	0.7425
At most 3	0.0235	3.0744	3.8415	0.0795

Max-eigenvalue test indicates no cointegrating eqn(s) at the 0.05 level
**denotes rejection of the hypothesis at the 0.05 level*
***MacKinnon-Haug-Michelis (1999) p-values*

Source: *Eviews 8 Output*

Having tested for cointegration, the study estimated unrestricted VAR in levels using one lag of each variable and including a constant. In the literature it has been demonstrated that VAR model

can be applied in levels irrespective of whether the variables are *I(0)* or *I(1) (*Pesaran and Pesaran, 1997*)* .

Table 4.3: Vector Autoregression Estimates of CA OILB OPP and TOT

	CA	*OILB*	*OPP*	*TOT*
CA(-1)	0.9542	0.0005	0.0006	-0.0001
	(0.0369)	(0.0008)	(0.0007)	(0.0005)
	(25.8325)	(0.6015)	(0.8800)	(-0.2815)
OILB(-1)	1.0343	0.9602	0.0056	0.0063
	(2.1277)	(0.0441)	(0.0403)	(0.0299)
	(0.4861)	(21.7876)	(0.1391)	(0.2101)
OPP(-1)	-0.0495	0.0075	0.9713	0.0407
	(1.5829)	(0.0328)	(0.0300)	(0.0223)
	(-0.0313)	(0.23302)	(32.4077)	(1.8292)
TOT(-1)	-0.9865	-0.0391	-0.0427	0.9792
	(1.0806)	(0.0223)	(0.0205)	(0152)
	(-0.9129)	(1.7458)	(-2.0868)	(64.4387)
C	1.0613	0.1279	0.6775	0.0532
	(3.5332)	(0.0732)	(0.0669)	(0.00497)
	(0.3004)	(1.7476)	(1.0085)	(1.0706)
R-squared	0.9310	0.9446	0.9605	0.9756
Adj. R-square	0.9288	0.9429	0.9593	0.9749
F-statistics	431.79	545.51	778.20	1281.74
Akaike AIC	4.6542	-3.0998	-3.2795	-3.8743
Schwarz SC	4.7628	-2.9912	-3.1708	-3.7656

The model explain changes in current account well with an adjusted R-square of 93 percent, the coefficient of oil balance is 1.03, reflecting an improvement in the current account as a result of oil price changes. Oil exporters have large oil surpluses, but spend a large part of them on imports of goods and services, leading to a much smaller current account surplus. The openness variable has a systematic worsening effect on the current account. The coefficient is -0.05, this result is consistent with the approach of trade openness as a proxy for trade reforms. With the fast liberalization of trade, imports of high-quality products have increased to a developing country

like Nigeria, resulting in a worsening of external accounts, which calls for a depreciation of the real exchange rate to raise export revenues that could bring the current account back to equilibrium. The coefficient of the TOT is negative implying that the volume effect outweighs the value effect leading to worsening of current account.

Table 4.4: Johansen Cointegration Test for RP RGDP GCONS and PCONS

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	*Eigenvalue*	*Trace Statistics*	*0.05 Critical Value*	*Prob. **
*None**	0.2565	50.5160	47.8561	0.0275
At most 1	0.0519	12.3048	29.7971	0.9207
At most 2	0.0387	5.4268	15.4947	0.7619
At most 3	0.0026	0.3415	3.8415	0.5590
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
**denotes rejection of the hypothesis at the 0.05 level*				
***MacKinnon-Haug-Michelis (1999) p-values*				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob. **
*None**	0.2564	38.2112	27.5843	0.0015
At most 1	0.0519	6.8780	21.1316	0.9585
At most 2	0.0387	5.0853	14.2646	0.7310
At most 3	0.0026	0.3415	3.8415	0.5590
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
**denotes rejection of the hypothesis at the 0.05 level*				
***MacKinnon-Haug-Michelis (1999) p-values*				

Table 4.5: Normalized Cointegrating Vector

1 Cointegrating Equation(s)	*Log likelihood*	*1703.163*
Normalized cointegrating coefficients (standard error in parentheses)		
RP	***RGDP***	***GCONS***	***PCONS***
1.000000	***-0.157168***	***-0.228525***	***-0.132178***

(0.37789)	*(0.17236)*	*(0.33684)*	

Source: Eviews 9 Output

The result from the relative price equation, reveals that the trace and the maximum eigenvalue statistics show the existence of one cointegrating relationship between relative price RP, RGDP GCONS and PCONS at the 5% level of significance (Table 4.5). The conclusion drawn from this result is that, their exist a unique long run relationship between relative prices and its determinants. Since there is one cointegrating vector, an economic interpretation of the long run relative prices can be obtained by normalizing the estimate of the unconstrained cointegrating vector on the relative prices.

Table 4.6: Johansen Cointegration Test for REER RP* and CA*

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	*Eigenvalue*	*Trace Statistics*	*0.05 Critical Value*	*Prob. ***
None*	0.0657	17.4001	29.7971	0.6104
At most 1	0.0339	8.6365	15.4947	0.4001
At most 2	0.0319	4.1859	3.8415	0.0408
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
****denotes rejection of the hypothesis at the 0.05 level***				
*****MacKinnon-Haug-Michelis (1999) p-values***				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	*Eigenvalue*	*Trace Statistics*	*0.05 Critical Value*	*Prob. ***
None*	0.0657	8.7644	21.1316	0.8510
At most 1	0.0339	4.4506	14.2646	0.8090
At most 2	0.0319	4.1859	3.8415	0.0408

Source: Eviews 9 Output

To estimate the equilibrium exchange rate, the estimated coefficient as obtained from the CA and RP equations are estimated in a cointegrating relationship with the real effective exchange rate REER. However, the result from the Johansen cointegration test suggest that there is no long run

relationship between REER CA* and RP*. This led to the estimation of unrestricted VAR as presented in Table 4.7

Table 4.7: Vector Autoregression Estimates of REER RP* and CA*

	REER	*RP**	*CA**
REER(-1)	0.9824	0.0018	-0.8850
	(0.0152)	(0.0041)	(0.7792)
	(64.4927	(0.4280)	(-1.1358)
RP(-1)	-0.0216	0.9556	4.1888
	(0.0847)	(0.0228)	(4.3297)
	(-0.2550)	(41.8919)	(0.9675)
CA(-1)	0.0006	-0.0002	0.9587
	(0.0005)	(0.0001)	(0.0255)
	(-1.1224)	(-1.5572)	(37.6368)
C	0.0160	-0.0314	4.7747
	(0.0611)	(0.0165)	(3.1256)
	(0.2623)	(-1.9059)	(1.5276)
R-square	0.9735	0.9387	0.9330
Adj. R-square	0.9729	0.9373	0.9315
F-statistics	1580.177	658.5180	599.1861
Akaike AIC	-3.3319	-5.9543	4.5377
Schwarz SC	-3.2450	-5.8674	4.6246

Source: Eviews 9 Output

Table 4.7 shows the connecting relationship between real effective exchange rate to internal and external balances given by REER CA* and RP*. The signs are in line with expectations. An increase (decrease) in relative prices of non-tradable goods is associated with an appreciation (depreciation) of the real exchange rate, whist a worsening (improvement) in current account result in a depreciation (appreciation) of the real exchange rate. The ensuing exchange rate misalignment series generated from the relationship in Table 4.7, is presented in Table 4.8 below.

Table 4.8: Misalignment Series Generated by the FEER method

Range	Min	Max	Average
1981:Q1-1985Q1	0	3.53	1.26
1985:Q2-1987:Q4	-0.17	-9.67	-2.79
1988:Q2-1988:Q3	0.04	4.8	1.68
1988:Q4-1989:Q4	-0.13	-0.86	-0.33
1990Q1		0.25	0.25

1990Q2-1992:Q3	-0.3	-2.05	-0.94
1992:Q4		0.11	0.11
1993:Q1		-0.41	-0.41
1993:Q2-1994:Q4	0.51	8.62	2.87
1995:Q1-1995:Q2	-0.04	-4.25	-2.14
1995:Q3-1998:Q1	0.56	3.08	1.28
1998:Q2-1994:Q4	-0.15	-7.69	-2.20
2000:Q1-2001:Q4	0.24	2.4	0.68
2002Q1		-0.05	-0.05
2002:Q2-2002:Q4	0.03	0.09	0.07
2003Q1		-0.53	-0.53
2003:Q2-2005:Q2	0.04	0.99	0.25
2005:Q3-2007:Q3	-0.07	-1.19	-0.36
2007:Q4-2008:Q2	0.14	0.18	0.56
2008:Q3-2009:Q3	-0.02	-1.49	-0.42
2009:Q4-2010:Q4	0.21	1.12	0.47
2011:Q1		-0.36	-0.36
2011:Q2-2012:Q1	0.34	3.5	1.25
2012:Q2-2013:Q3	-0.06	-8.55	-2.39
2013:Q4-2014:Q2	0.72	3.6	2.17

Misalignment rates (%). Note: Misalignment rate=(REER−FEER)/FEER*100%; a positive (negative) misalignment rate implies an overvaluation (undervaluation) of the real effective exchange rate.

The misalignment series generated through the FEER approach as presented in Table 4.8 shows that the longest periods of misalignment was recorded between 1981:Q1-1985:Q1 with a maximum overvaluation of 3.53% with an average of 1.26%. This was followed closely with the highest degree of misalignment, with an average undervaluation of -2.79% and a maximum of (-9.67%) and a minimum of -0.17% between 1985Q2 and 1987Q4. Compared with the misalignment series using NATREX approach, exchange rate misalignment persisted more under the FEER, for instance, overvaluation lasted for 17 quarters in the first period. In the second period, undervaluation lasted for 11 quarters and afterwards ranges between 1 and 5 quarter(s). As shown in the Figure 2, the actual real effective exchange rate follows its equilibrium path with much of the deviation recorded at the beginning of the study period. The misalignment plot in Figure 3, shows varying degree of misalignment (as evidence from deviation from equilibrium path),

however, the lowest degree of misalignment was recorded between 2000 and 2005 as evidenced from the misalignment plot.

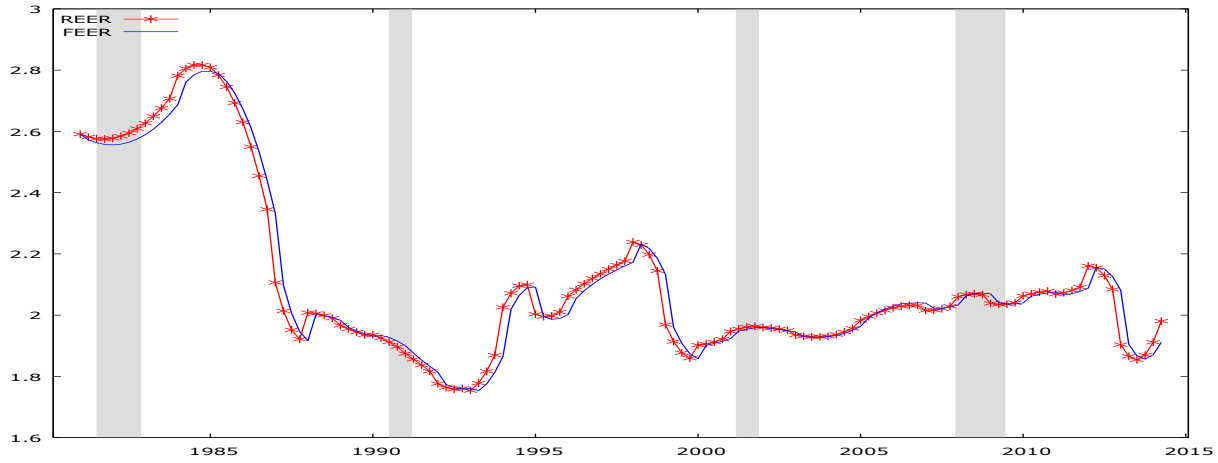


Figure 2. The relationship between Actual REER and its Equilibrium Value (FEER)

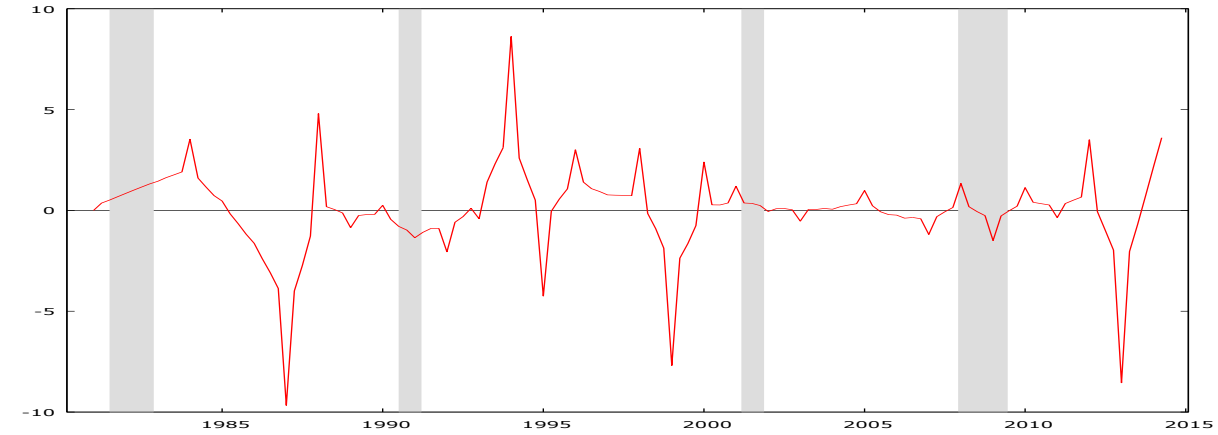


Figure 3. Exchange Rate Misalignment Series Generated by the FEER Methodology

Model Evaluation Statistics

RMSE	*MAE*	*Theil*
3.9883	*3.7586*	*0.5293*

4.1.3 Model 2: Analysis of Structural VAR

The unit root test implies that the empirical model should be estimated as a vector auto-regression model in first differences. Hence, defining $\Delta Xt \equiv (\Delta op, \Delta y, \Delta r, \Delta p)$ where the four variable VAR

includes; oil price (op), relative output (y), real effective exchange rate (r) and relative prices (p) in which case four structural shocks can be identified; real demand shocks (η_D), nominal shocks (η_N), aggregate supply shocks (η_S) and oil price shocks (η_{OP}). The estimated impulse response to oil price shock, supply shock, demand shock and nominal or monetary shock are displaced in appendix 1. The four columns from left to right and the corresponding rows show the response of real oil price, relative output, real effective exchange rate and relative price to oil price shock, supply shock, demand shock and nominal shock. Within each panel, the solid line shows the impulse response with the dotted line depicting 95% Efron percentile confidence interval.

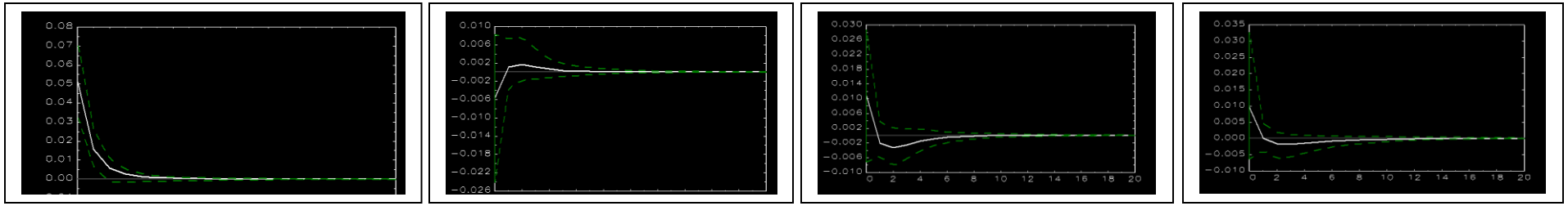
The result from the impulse response function presented in Figure 4, panel 3 shows that, a positive oil price shock appreciates the real exchange rate up to the 4th horizon after which the effect of the shock faded out with time. Also, a positive supply shock depreciates the exchange rate in the long run. A nominal shock which is associated with a monetary innovation induces a temporary appreciation in the earlier period horizon and initiated depreciation from the 3rd to 4th horizon until its effect petered out. A positive oil price shock as well as demand shock increase relative prices in the long run. However, nominal and supply shock leads to a fall in relative price in the long run.

A positive oil price shock leads to increase output up to the 2nd horizon after which it started falling up till the 4th horizon until the effect dissipated in subsequent horizon, real exchange rate appreciate as a result of rise in output and relative prices increase up till the 12th period horizon. A positive supply shock leads to a rise in oil price temporarily leads to a fall in relative output; this is not consistent with the Balassa-Samuelson effect which posits that an improvement in technology or increase in efficiency leads to expansion in output. The fall in output (income) generated by positive supply shock leads to real exchange rate depreciation and a fall in relative prices. The most consistent finding is that the response of the real exchange rate to supply shocks is always of

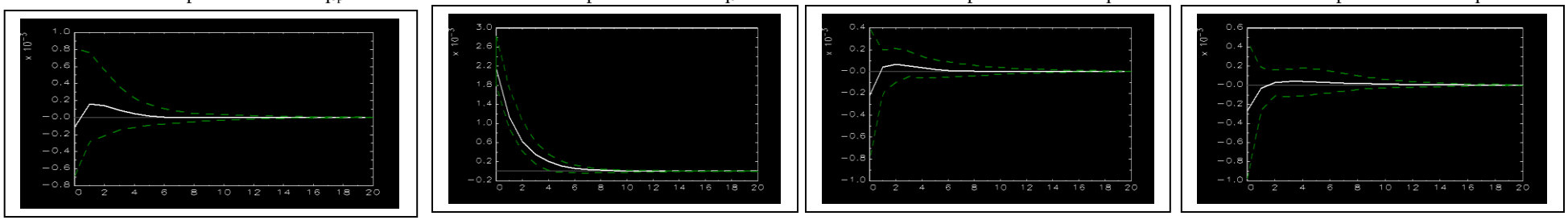
opposite sign from what is predicted by the Dornbusch-type model. According to Edward (1989) model, the effect of technological progress on the real exchange rate depends on two things: how technological progress affects different sector and the type of progress considered, whether product augmenting or factor augmenting. If any productivity shock occurred, it would have a positive income effect, which would in turn generate a positive demand pressures on non-tradable, and hence lead to an appreciation in real exchange rate. The channel through which technological progress could lead to depreciation is when the supply effect offset the demand effect.

A positive real demand shock like fiscal expansion, temporarily increase output in the 2^{nd} horizon which later fell until it asymptote to zero, this depreciate the real exchange rate and increase price gradually, thereafter declining gradually to the base-line level. The temporary rise in output to real demand and nominal shocks is consistent with short run price rigidities. Evidence from the impulse response function shows that nominal shock (monetary innovation), temporarily increase relative output up till the 5^{th} period horizon, the real exchange rate appreciate temporarily after which it asymptote to zero. However, the relative price decline to its long run value.

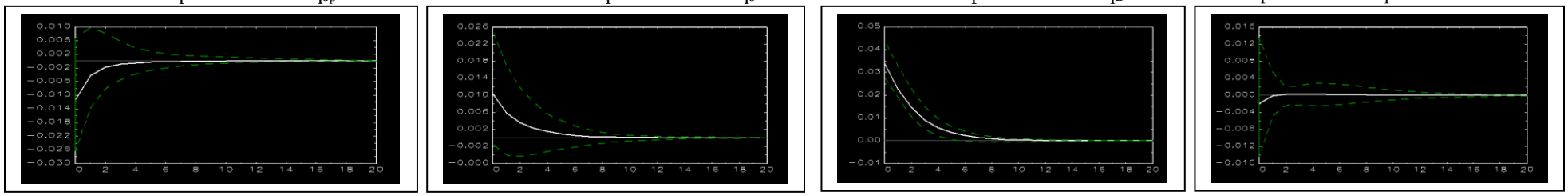
Accumulated Response of Δop to η_{op} Accumulated Response of Δop to η_s Accumulated Response of Δop to η_D Accumulated Response of Δop to η_N



Accumulated Response of ΔY to η_{op} Accumulated Response of ΔY to η_s Accumulated Response of ΔY to η_D Accumulated Response of ΔY to η_N



Accumulated Response of ΔR to η_{op} Accumulated Response of ΔR to η_s Accumulated Response of ΔR to η_DAccumulated Response of ΔR to η_N



Accumulated Response of ΔRP to η_{op} Accumulated Response of ΔRP to η_s Accumulated Response of ΔRP to η_D Accumulated Response of ΔRP to η_N

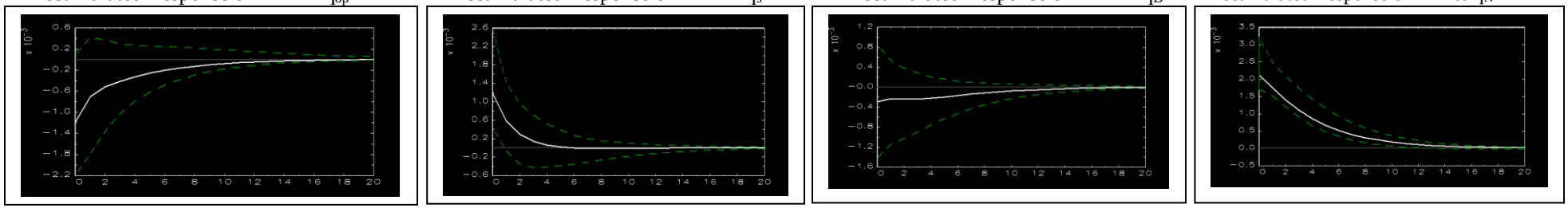


Figure 4: Impulse Response Function

Table 4.9: Estimated Long Run Multiplier Matrix

$$\begin{matrix} & \eta_{OP} & \eta_S & \eta_D & \eta_N \end{matrix}$$
$$\begin{bmatrix} OP \\ Y \\ R \\ RP \end{bmatrix} \begin{bmatrix} 0.0796 & 0.0000 & 0.0000 & 0.0000 \\ 0.0003 & 0.0047 & 0.0000 & 0.0000 \\ -0.0197 & 0.0262 & 0.0952 & 0.0000 \\ -0.0043 & 0.0022 & -0.0023 & 0.0102 \end{bmatrix}$$

From table above, the estimated long run matrix shows that a positive oil price shock leads to increase in relative output, depreciation of the exchange rate and a fall in relative prices. A positive supply shock is restricted to have no long run effect on oil price, but is estimated to have positive effect on relative output, appreciation of the real exchange rate and increase in relative price. A positive demand shock is restricted to have no long run effect on relative oil price and relative output, but have positive effect on exchange rate and a fall in relative price. Nominal shocks are restricted to have only long run effect on relative price, which was estimated to be positive in response to an expansionary monetary shock. All the long run multipliers obtained from the restricted estimation is consistent with the theoretical model of the new open economy macroeconomics. The relative contributions of real oil price shocks, nominal shock, relative demand shock and supply shock can be gauged through the forecast error variance decompositions. Table 4.10 reports the variance decompositions for the real effective exchange rate, real oil price, relative GDP and relative prices in logarithmic first differences at selected horizons.

The initial contribution of oil price shocks, demand shock, and nominal shocks to relative GDP movements are 1st to the 20th horizon. Supply shock explains the majority of the forecast error variance of relative GDP constituting 97% of variation in relative GDP at all horizons. This finding is broadly in line with other studies utilizing Blanchard and Quah's (1989) methodology.

For an oil dependent country like Nigeria, stochastic shock to the goods market (shock to IS curve) may precipitate excessive exchange rate volatility. As evidence from the FEVD, this view is supported by the data as demand shock constitute 83% of variation in exchange rate in the 1st quarter and rose to 86% in the 2nd quarter and remain so up till the 20th horizon. This could be the result of high fiscal spending that mostly characterized period of positive oil price shock.

Table 4 .10: Variance Decomposition of RGDP, REER, Oil price and Relative price

% of Variance In RGDP due to:					% of Variance In REER Due to:					% of Variance In Oil price Due to:					% of Variance In Relative Price Due to:				
	η_{op}	η_s	η_d	η_n		η_{op}	η_s	η_d	η_n		η_{op}	η_s	η_d	η_n		η_{op}	η_s	η_d	η_n
1	0.00	0.97	0.01	0.01	1	0.09	0.08	0.83	0.00	1	0.92	0.01	0.04	0.03	1	0.19	0.19	0.01	0.61
2	0.01	0.97	0.01	0.01	2	0.07	0.07	0.85	0.00	2	0.92	0.01	0.04	0.03	2	0.17	0.15	0.01	0.67
3	0.01	0.97	0.01	0.01	3	0.07	0.07	0.86	0.00	3	0.92	0.01	0.04	0.03	3	0.16	0.13	0.01	0.69
4	0.01	0.97	0.01	0.01	4	0.07	0.07	0.86	0.00	4	0.91	0.01	0.04	0.03	4	0.15	0.12	0.02	0.71
5	0.01	0.97	0.01	0.01	5	0.06	0.07	0.86	0.00	5	0.91	0.01	0.04	0.03	5	0.15	0.12	0.02	0.71
6	0.01	0.97	0.01	0.01	6	0.06	0.07	0.86	0.00	6	0.91	0.01	0.04	0.03	6	0.15	0.11	0.02	0.72
7	0.01	0.97	0.01	0.01	7	0.06	0.07	0.86	0.00	7	0.91	0.01	0.04	0.03	7	0.15	0.11	0.02	0.72
8	0.01	0.97	0.01	0.01	8	0.06	0.07	0.86	0.00	8	0.91	0.01	0.04	0.03	8	0.15	0.11	0.02	0.72
9	0.01	0.97	0.01	0.01	9	0.06	0.07	0.86	0.00	9	0.91	0.01	0.04	0.03	9	0.15	0.11	0.02	0.72
10	0.01	0.97	0.01	0.01	10	0.06	0.07	0.86	0.00	10	0.91	0.01	0.04	0.03	10	0.15	0.11	0.02	0.72
11	0.01	0.97	0.01	0.01	11	0.06	0.07	0.86	0.00	11	0.91	0.01	0.04	0.03	11	0.15	0.11	0.02	0.72
12	0.01	0.97	0.01	0.01	12	0.06	0.07	0.86	0.00	12	0.91	0.01	0.04	0.03	12	0.15	0.11	0.02	0.72
---					---					---					---				
20	0.01	0.97	0.01	0.01	20	0.06	0.07	0.86	0.00	20	0.91	0.01	0.04	0.03	20	0.15	0.11	0.02	0.72

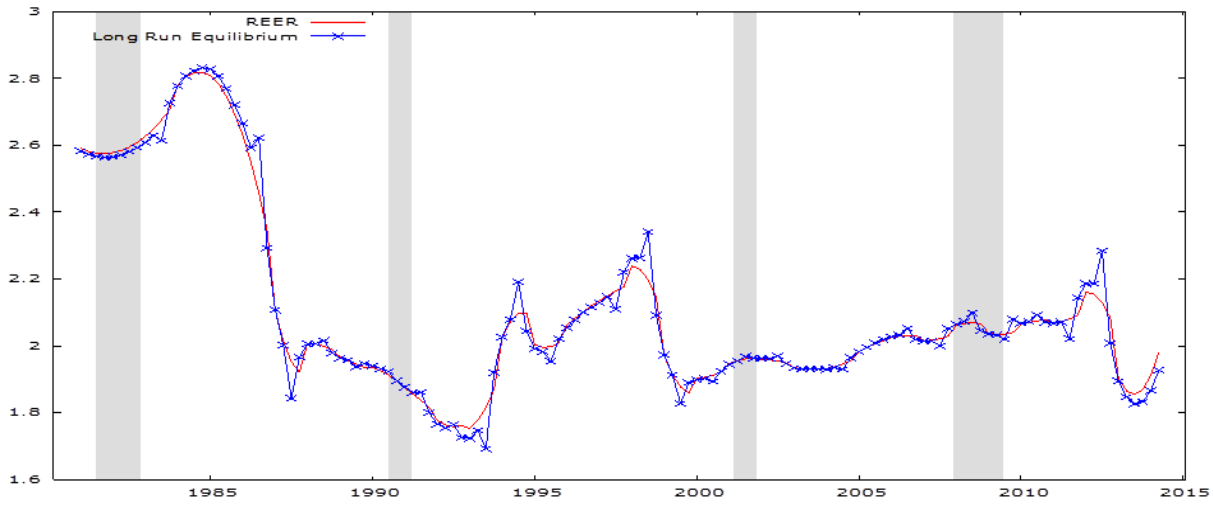


Figure 5. Real Effective Exchange Rate and its Long Run Equilibrium

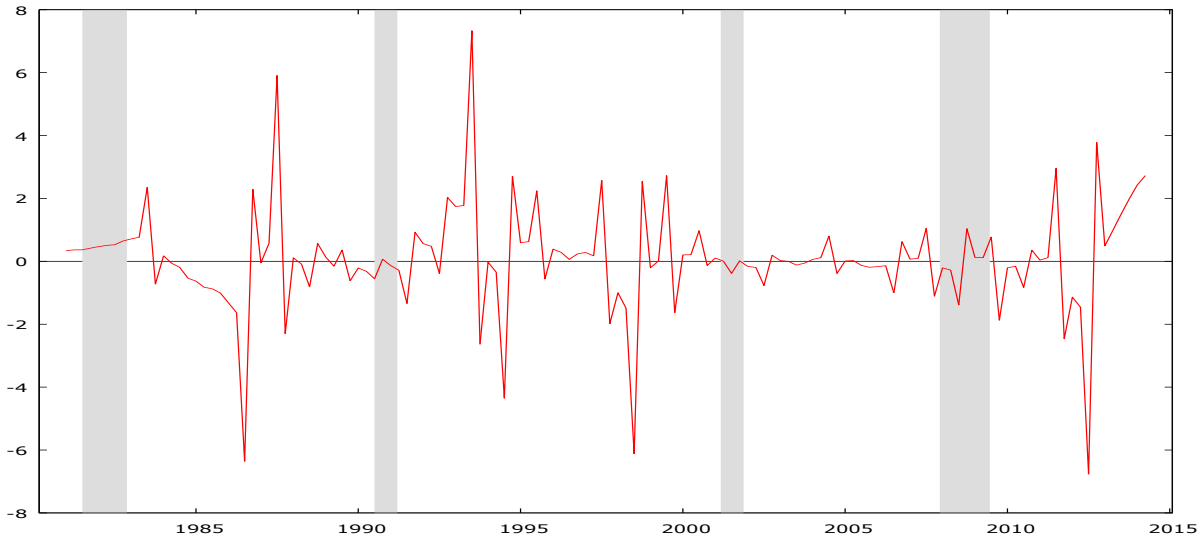


Figure 6: Exchange Rate Misalignment Series Generated by the SVAR Methodology

The result of exchange rate misalignment generated from the SVAR approach as presented in Table 4.11 shows that the episodes of misalignment have shorter horizon in terms of frequency of occurrence. The longest period of exchange rate misalignment occurred between 1981:Q1-1983:Q3 with an average and maximum overvaluation of 2.35%. This was followed closely by an average and maximum undervaluation of -6.36% and a minimum of -0.06 between 1984:Q2-1986:Q3. In terms of magnitude, the highest incidence of misalignment was recorded between 1992:Q4-1993:Q3 with an average and maximum of 7.33% and a minimum of 1.74. However, the actual real effective exchange rate was closest to its equilibrium value between 2001:Q1-2001:Q2. This is further shown in the relationship between equilibrium exchange rate and actual real effective exchange rate as evident in Figure 5. Also, the trend of the misalignment series shows an explosive dynamics with periods of overvaluation alternating periods of undervaluation as evident in Figure 6.

Table 4.11: Misalignment Series Generated by the SVAR method

Range	Min	Max	Average	Range	Min	Max	Average
1981:Q1-1983:Q3	0.34	2.35	2.35	1998Q4		2.54	2.54
1983Q4		-0.72	-0.72	1999Q1		-0.21	-0.21
1984Q1		0.17	0.17	1999:Q2-1999:Q3	0.01	2.72	2.72
1984:Q2-1986:Q3	-0.06	-6.36	-6.36	1999Q4		-1.63	-1.63
1986Q4		2.29	2.29	2000:Q1-2000:Q3	0.20	0.97	0.97
1987Q1		-0.05	-0.05	2000Q4		-0.13	-0.13
1987:Q2- 1987:Q3	0.57	5.91	5.91	2001:Q1-2001:Q2	0.00	0.11	0.00
1987:Q4		-2.30	-2.30	2001Q3		-0.38	-0.38
1988Q1		0.11	0.11	2001Q4		0.02	0.02
1988:Q2-1988Q3		-0.81	-0.81	2002:Q1-2002:Q3	-0.16	-0.77	-0.77
1988:Q4-1989:Q1	0.13	0.57	0.13	2002:Q4-2003:Q1	0.03	0.19	0.03
1989Q2		-0.16	-0.16	2003:Q2-2003:Q4	0.00	-0.12	-0.06
1989Q3		0.36	0.36	2004:Q1-2004:Q3	0.06	0.80	0.80
1989:Q4-1990:Q3	-0.21	-0.62	-0.56	2004Q4		-0.38	-0.38
1990Q4		0.07	0.07	2005:Q1-2005:Q2	0.01	0.02	0.02
1991:Q1-1991:Q3	-0.14	-1.34	-1.34	2005:Q3-2006:Q3	-0.13	-1.01	-1.01
1991:Q4-1992:Q2	0.48	0.92	0.48	2006:Q4-2007:Q3	0.07	1.05	1.05
1992Q3		-0.38	-0.38	2007:Q4-2008:Q3	-0.21	-1.39	-1.39
1992:Q4-1993:Q3	1.74	7.33	7.33	2008:Q4-2009:Q3	0.12	1.04	0.77
1993:Q4-1994:Q3	-0.03	-4.35	-4.35	2009:Q4-2010:Q3	-0.16	-1.87	-0.83
1994:Q4-1995:Q3	0.59	2.71	2.24	2010:Q4-2011:Q3	0.04	2.96	2.96
1995Q4		-0.56	-0.56	2011:Q4-2012:Q3	-1.14	-6.76	-6.76
1996:Q1-1997:Q3	0.06	2.57	2.57	2012:Q4-2014:Q2	0.49	3.78	2.72
1997:Q4-1998:Q3	-1.00	-6.12	-6.12				

4.1.4 Model 3: Natural Equilibrium Exchange Rate (NATREX)

The standard Augmented Dickey-Fuller (ADF) and Philip-Perron unit root test was exercised to check the order of integration of these variables. The results obtained are reported in Table 4.1. Based on the ADF test statistic, it was found that out of 6 variables in the model, 4 have unit root while 2 are I(0) variable. In other words, the test revealed that the variables rgdp, gcons, tot reer, are all stationary at first difference. The variables are integrated at order one; this implies that the null hypothesis of non-stationarity for all the variables is rejected. However, dependency ratio of the young population (depy) and old dependency ratio (depo) are integrated at order zero

(stationary at levels). Noticeably, the mixture of both I(0) and I(1) variables would not be possible under the Johansen procedure. This gives a good justification for using the bounds test approach, or ARDL model, which was proposed by Pesaran *et al*. (2001).

Having established the unit root properties of our data, the nest step is to establish whether or not there is a long run cointegrating relationship among the variables in our model. The result shows that variables in the model tend to move together in the long run as predicted by economic theory. However, in the short run, deviation from this relationship could occur due to shock to any of the variables as a result of the differences in the dynamics governing short run real exchange rate and long run real exchange rate. Due to different forces shaping the dynamics of short run and long run, the short run interaction and the adjustment to long run equilibrium are important. The error correction term enable us to gauge the speed of adjustment of real effective exchange rate to its long run equilibrium. The intuition behind the error correction model is the need to recover the long run information lost by differencing the variables. The result shows that the speed of adjustment of the real effective exchange rate to the long run equilibrium path is low. Specifically only about 10 percent of the disequilibrium errors, which occurred in the previous quarter, are corrected in the current quarter.

In the long run changes in all the fundamental variables are responsible to correct any deviations from the equilibrium cointegrating relationship as indicated above. These clearly reiterate the importance of *TOT, DEPO, DEPY, GCONS & RGDP* in affecting changes in *REER* in the long run. The result from the short run indicated that all the variables are important determinants of the REER, except relative productivity (RGDP) and terms of trade (TOT). The negative signs of GCONS indicate depreciation effect of on REER, for instance, a higher fiscal spending in terms of government consumption as a percentage of GDP, financed by borrowing, increases the demand

for non-tradables and hence increases relative price of non tradables. In the long-run, consumption financed by borrowing generates capital inflows and drives the interest rate higher. It also lowers foreign assets. Capital decreases not only because of higher user cost of capital generated by higher interest rate but also because of higher risk premium generated by lower foreign assets. Lower foreign assets reduce demand for non-tradables as wealth declines, hence; depreciate the real exchange rate in the long run. Consequently, the domestic price level will rise inducing an appreciation of the real exchange rate. An alternative channel identified by Balvers and Bergstrand (2002) find evidences that large government expenditure are associated with an exchange rate appreciation in the medium run through the resource withdrawal and consumption-tilting channels.

Table 4.12: ARDL Cointegration and Long run form for NATREX Model

Cointegration Form				
Variable	***Coefficient***	***Std. Error***	***T-Statistics***	***Prob***
Δ(REER(-1))	0.6155	0.0609	10.1014	0.0000
Δ(GCONS)	0.5002	0.0505	9.9054	0.0000
Δ(GCONS(-1))	-0.3041	0.0568	-5.3527	0.0000
Δ(DEPY)	96.5076	18.5740	5.1958	0.0000
Δ(DEPO)	-103.9036	12.0244	-8.6410	0.0000
Δ(DEPO(-1))	40.8261	8.2911	4.9241	0.0000
Δ(TOT)	0.0788	0.0623	1.2664	0.2078
Δ(RGDP)	-0.0187	0.2751	-0.0682	0.9457
CointEq(-1)	-0.8426	0.0513	-2.5211	0.0531
Cointeq = **-(-0.8426***_GCONS_**-35.3176***_DEPY_**+0.8668***_TOT_**+1.0804***_RGDP_**+ 78.5114)**				
Long Run Coefficients				
Variable	***Coefficient***	***Std. Error***	***T-Statistics***	***Prob***
GCONS	-0.8426	0.1721	-4.8973	0.0000
DEPY	-35.3176	8.8378	-3.9962	0.0001
DEPO	62.8549	9.6198	6.5339	0.0000
TOT	0.8668	0.3378	2.5662	0.0115
RGDP	1.0803	0.6908	1.5639	0.1205
C	78.5114	11.3351	6.9264	0.0000

Source: Eviews 9 Output (Student Version)

The term of trade variable is positive, implying appreciation of the real exchange rate as a result of TOT shock. This implies that the investment effect dominates the consumption effect; net

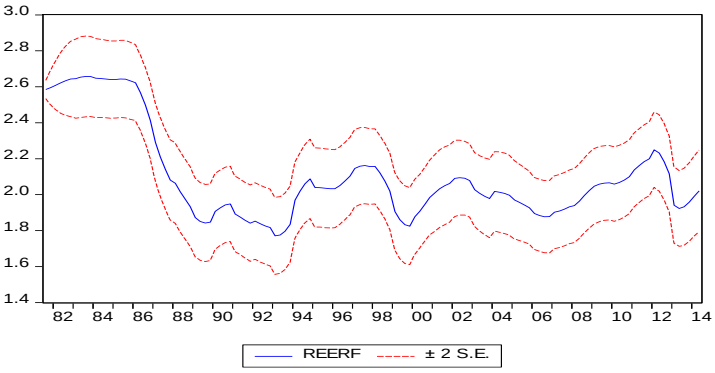
wealth will increase as a result of increase in foreign asset which appreciates the real exchange rate in the long run. The coefficient is close to unity, implying that the indirect effect is very negligible.

A higher young dependency ratio raises consumption of non-tradable and hence raises the price of non-tradable. In the long-run, higher consumption increases borrowing from foreign countries and leads to net long-term capital inflows and lower foreign assets. Capital decreases due to the higher risk premium generated by lower foreign assets. With lower foreign assets, wealth reduces unambiguously and so does the demand for non-tradable given that the non-tradable sector is labor intensive. Decline in capital increases supply of non-tradable. Both factors reduce price of non tradables to a level lower than the original point and hence reduce *REER* in the long-run as indicated by estimated coefficient of the young dependency ratio (*DEPY*). However, the coefficient of the old dependency ratio (*DEPO*) is significant but wrongly signed. The positive and significant coefficient of *DEPO* implies that high income to this group of the population through pension system could result to high demand for non tradables as a result, leading to appreciation of the real exchange rate through wealth effect. The relative productivity variable is correctly signed but insignificant implying that the Balassa-Samuelson effect is not fully enforced in the NATREX framework.

Table 4.13: Misalignments Series Generated through NATREX Model

Range	Min	Max	Average	Range	Min	Max	Average
1981:Q3-1982:Q3	-0.04	-0.33	-0.2	1996:Q2-1997:Q1	-0.17	-1.24	-0.64
1982:Q4-1984:Q1	0.07	2.6	0.72	1997:Q2-1998:Q1	0.38	2.39	1.06
1984:Q2			-0.51	1998Q2		-0.2	-0.2
1984:Q3-1985:Q1	0.26	0.52	0.39	1998:Q3-1998:Q4	0.21	0.5	0.36
1985:Q2-1986:Q1	-0.23	-0.75	-0.41	1999Q1		-2.56	-2.56
1986Q2		0.26	0.26	1999:Q2-1999:Q3	0.16	1.81	0.99
1986:Q3-1987:Q1	-0.39	-4.82	-1.95	1999:Q4-2000:Q4	-0.04	-0.91	-0.49
1987Q2		2.07	2.07	2001Q1		0.62	0.62
1987Q3		-0.15	-0.15	2001:Q2-2002:Q4	0.06	-1.09	-0.65
1987:Q4-1988:Q1	0.25	3.77	2.01	2003Q1		0.94	0.94
1988Q2		-1.29	-1.29	2003:Q2-2004:Q1	-0.06	-2.56	-0.88
1988:Q3-1989:Q1	0.43	1.28	0.74	2004:Q2-2005:Q1	0.08	1.78	0.88
1989Q2		-0.23	-0.23	2005Q2		-0.22	-0.22
1989Q3		0.08	0.08	2005:Q3-2006:Q4	0.19	1.69	0.73
1989:Q4-1990:Q1	-0.12	-2.18	-1.15	2007Q1		-1.29	-1.29
1990Q2		0.46	0.46	2007:Q2-2008:Q1	0.4	1.84	1.04
1990:Q3-1990:Q4	-0.35	-0.51	-0.43	2008:Q2-2009:Q1	-0.33	-1.35	-0.77
1991Q1		2.31	2.31	2009:Q2-2010:Q1	0.07	1.27	0.58
1991:Q2-1992:Q1	-0.26	-2.88	-1.54	2010:Q2-2011:Q1	-0.3	-1.89	-0.93
1992Q2		1.71	1.71	2011Q2		0.13	0.13
1992Q3		-0.08	-0.08	2011:Q3-2011:Q4	-0.34	-0.48	-0.41
1992:Q4-1993:Q1	0.09	1.5	0.8	2012Q1		0.61	0.61
1993Q2		-0.35	-0.35	2012Q2		-0.39	-0.39
1993:Q3-1994:Q1	0.26	0.85	0.48	2012:Q3-2012:Q4	0.2	0.33	0.26
1994:Q2-1995:Q1	-0.41	-1.61	-0.78	2013:Q1-2013:Q4	-0.26	-1.17	-0.82
1995:Q2-1996:Q1	0.29	2	0.91	2014:Q1-2014:Q2	1.23	0.43	0.83

The misalignment series as presented inTable 4.13, the longest periods of exchange rate misalignment was experience between 1982:Q2-1984:Q1 with an average and maximum overvaluation of 0.72% and 2.6 respectively. The period with the maximum misalignment is an undervaluation of -4.82% and an average of -1.95%. This was followed closely by an overvaluation of 3.77% between 1987:Q4-1988:Q1 with an average of 2.01%. One key characteristic with the misalignment series under the NATREX model is that period of overvaluation alternate periods of undervaluation without any long periods of exchange rate misalignment.



Forecast: REERF
Actual: REER
Forecast sample: 1981Q1 2014Q2
Adjusted sample: 1981Q3 2014Q2
Included observations: 132

Root Mean Squared Error	0.080918
Mean Absolute Error	0.065126
Mean Abs. Percent Error	3.116122
Theil Inequality Coefficient	0.019116
Bias Proportion	0.000128
Variance Proportion	0.045483
Covariance Proportion	0.954389

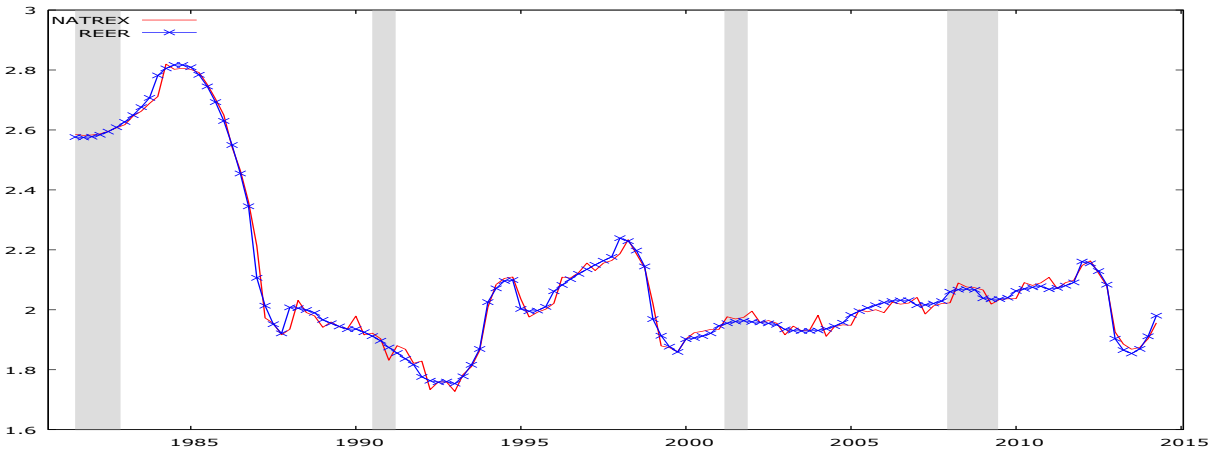


Figure 7. ***The relationship between Actual REER and its Equilibrium Value (NATREX)***

The gap between the actual exchange rate and equilibrium exchange rate as presented in Figure 7 shows that disequilibrium existed throughout the study period but the magnitude is not too alarming. Also, the misalignment series as presented in Figure 8 shows a high frequency of exchange rate misalignment above and below the equilibrium line.

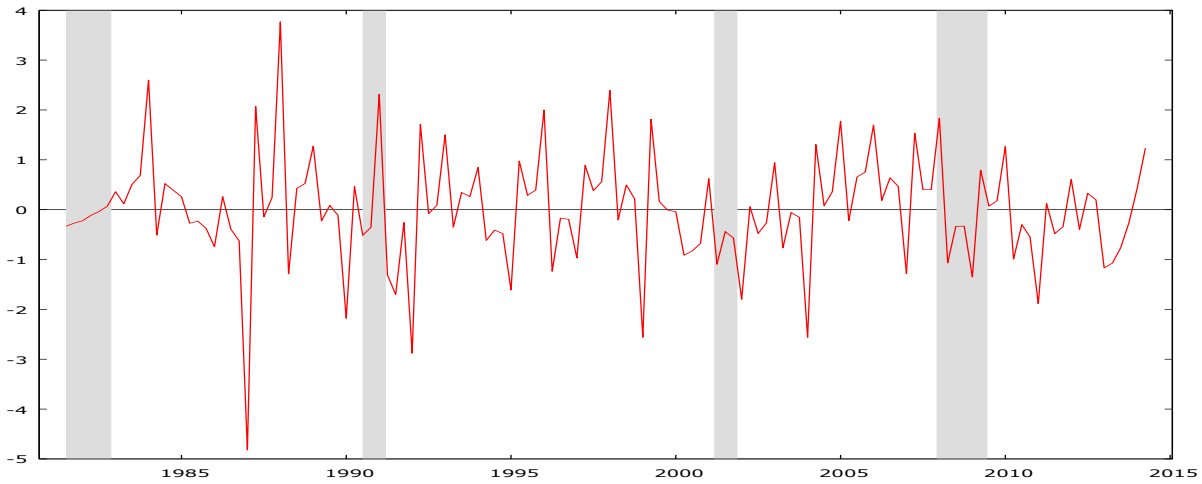


Figure 8. Exchange Rate Misalignment Series Generated by the NATREX Methodology

4.1.5 Model 4: Behavioural Equilibrium Exchange Rate (BEER)

The error-correction term presented in Table 4.14, is correctly signed and significant. This shows that, in the short run, deviation from this relationship could occur due to shock to any of the variables as a result of the differences in the dynamics governing short run real exchange rate and long run real exchange rate. Due to different forces shaping the dynamics of short run and long run, the short run interaction and the adjustment to long run equilibrium are important. The error correction term enable us to gauge the speed of adjustment of real effective exchange rate to its long run equilibrium. The intuition behind the error correction model is the need to recover the long run information lost by differencing the variables. The result shows that the speed of adjustment of the real effective exchange rate to the long run equilibrium path is very low. Specifically only about 15 percent of the disequilibrium errors, which occurred in the previous quater, are corrected in the current quater.

The signs of some of the coefficients are consistent with what is expected, indicating that the theoretical model is relevant for the Nigeria. In particular, a rise in the terms of trade leads to an appreciation of the equilibrium exchange rate. Openness (OPP) variable is negative and significant, this is because oppennes increase the value of imports relative to export thereby

depreciating the real exchange rate by about 0.33 per cent point. Net foreign asset (NFA), although significant, does not carry its right sign (positive). In other words a positive sustainable NFA position allows persistent trade deficit to be run which are associated with an appreciated exchange rate. Government consumption (GCON) has a positive and significant effect on real exchange rate e.g exchange rate will appreciated in response to increase in government expenditure , expecially when such consumption is directed towards the non tradable sector. In other words, an improvement in government fiscal stance of 1 percentage point of GDP is associated with an appreciation of the real effective exchange rate of around 2.04 percent.

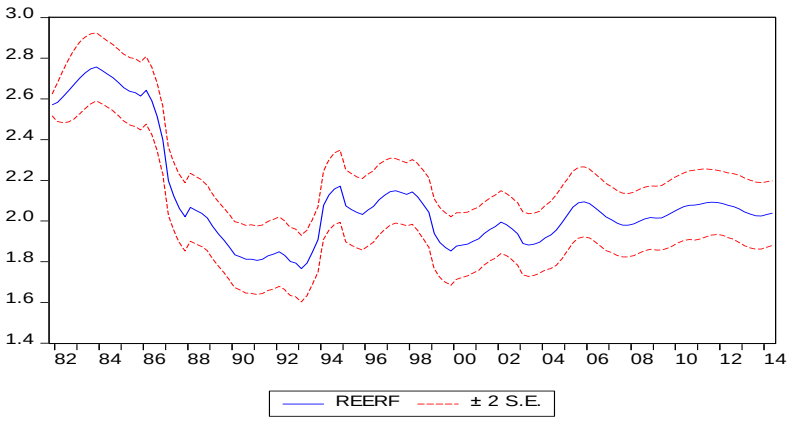
Table 4.14: ARDL Cointegration and Long run form for BEER Model

Cointegration Form				
Variable	***Coefficient***	***Std. Error***	***t-Statistics***	***Prob.***
Δ(REER(-1))	***0.4596***	***0.0764***	***6.0179***	***0.0000***
Δ(REER(-2))	***0.1719***	***0.0818***	***2.3950***	***0.0183***
Δ(OPV)	***0.0759***	***0.0273***	***2.7857***	***0.0063***
Δ(OPP)	***-0.2955***	***0.0557***	***-5.3017***	***0.0000***
Δ(OPP(-1))	***0.1534***	***0,0558***	***2.7479***	***0.0070***
Δ(MPR)	***-0.0190***	***0.0666***	***-0.2851***	***0.7761***
Δ(GCONS)	***1.2681***	***0.1979***	***6.4068***	***0.0000***
Δ(GCONS(-1))	***-0.7006***	***0.2201***	***-3.1832***	***0.0019***
Δ(GCONS(-2))	***-0.4755***	***0.2189***	***-2.1720***	***0.0319***
Δ(NFA)	***-0.0319***	***0.0159***	***-2.0098***	***0.0468***
Δ(TOT)	***0.1514***	***0.0629***	***2.4062***	***0.0177***
Δ(RPRO)	***0.0067***	***0.2676***	***0.0252***	***0.9799***
Δ(R-R)*	***0.0005***	***0.0002***	***2.3012***	***0.0232***
C	***0.0523***	***0.0093***	***5.5957***	***0.0000***
CointEq(-1)	***-0.1496***	***0.0242***	***-6.1840***	***0.0000***
*Cointeq = REER-(-0.1419*OPV-0.3288*OPP-0.1242*MPR+2.0419*GCONS-0.2596*NFA+0.4980*TOT+0.0472*RPRO+0.0015*R*				
Long Run Coefficients				
Variable	***Coefficient***	***Std. Error***	***t-Statistics***	***Prob.***
OPV	***-0.1419***	***0.0565***	***-2.5110***	***0.0135***
OPP	***-0.3288***	***0.1785***	***-1.8418***	***0.0681***
MPR	***-0.1243***	***0.1699***	***-0.7314***	***0.4661***
GCONS	***2.0419***	***0.3343***	***6.1085***	***0.0000***
NFA	***-0.2596***	***0.0751***	***-3.4581***	***0.0008***
TOT	***0.4980***	***0.1088***	***4.5763***	***0.0000***
RPRO	***0.0472***	***0.2528***	***0.1867***	***0.8523***
*R-R**	***0.0015***	***0.0009***	***1.7206***	***0.0881***

Source Eviews 9 Output

Interest rate differentials is positive and significant at 10 percent level of significance, which is in line with its apriori sign, in other words, an increase in real interest rate relative to the trading partner (proxied by US interest rate) of one percentage point is associated with an appreciation of the real effective exchange rate of around 0.15 percent. The real interest rate differential could represent several factors - aggregate demand, productivity, and persistent monetary policy - all pointing to a positive relationship with the real exchange rate. First, an increase in absorption relative to savings would put upward pressure on the real interest rate in an economy with less than perfect mobility. At the same time, the demand for both tradable and nontradable good would increase, inducing an increase in the price of nontradable, which, in turn, would result in an appreciation of the real exchange rate. Second, real interest differentials may also reflect productivity differentials: to the extent that the measure employed to poxy for the Balassa-Samuelson effect is not perfect, the real interest rate may help capture this empirically; also, if the productivity of capital rises with respect to trading partners, capital will flow to the home country, thereby inducing an appreciation of the real exchange rate. Third, a tightening of monetary policy would raise real interest rate - an outcome that would need to be associated with an expectation currency depreciation, given the interest parity condition. Hence, the nominal exchange rate would appreciate beyond its long run value, so as to allow the expected depreciation to occur once the monetary policy shock had disappeared (MacDonald and Ricci, 2003). Relative productivity RPRO which is a proxy for the Balassa-Samuelson effect is positive and insignificant; this could reflect large fluctuation in employment in Nigeria, which alters the link between labor productivity and total factor productivity[7].

[7] Similar result is also obtained in South Africa (see R. and R. L. Macdonald, 2003)



Forecast: REERF
Actual: REER
Forecast sample: 1981Q1 2014Q2
Adjusted sample: 1981Q4 2014Q2
Included observations: 131

Root Mean Squared Error	0.063607
Mean Absolute Error	0.049227
Mean Abs. Percent Error	2.337453
Theil Inequality Coefficient	0.015048
Bias Proportion	0.000752
Variance Proportion	0.020484
Covariance Proportion	0.978764

Table 4.15: Misalignment Series Generated from the BEER Model

Range	Min	Max	Average	Range	Min	Max	Average
1981Q4		0.17	0.17				
1982Q1-1983Q3	-0.70	0.00	-0.38	2000Q4		-0.09	-0.09
1984Q1	0.25	2.67	1.46	2001Q1		0.96	0.96
1984Q2		-0.03	-0.03	2001Q2-2002Q1	-0.94	-0.12	-0.55
1984Q3-1985Q2	0.12	0.80	0.47	2002Q2-2003Q1	0.46	1.09	0.81
1985Q3-1986Q2	-2.14	-0.03	-0.69	2003Q2-2004Q1	-0.50	-0.01	-0.30
1986Q3-1987Q1	0.24	0.79	0.50	2004Q2		0.26	0.26
1987Q2-1987Q4	-0.72	-0.12	-0.35	2004Q3-2005Q3	-1.12	-0.21	-0.57
1988Q1		0.99	0.99	2005Q4-2006Q4	0.05	0.27	0.21
1988Q2-1988Q3	-0.90	-0.59	-0.75	2007Q1		-0.82	-0.82
1988Q4-1990Q1	0.06	1.74	0.67	2007Q2-2008Q1	0.26	1.26	0.71
1990Q2		-0.37	-0.37	2008Q2		-0.40	-0.40
1990Q3-1991Q1	0.04	0.40	0.23	2008Q3-2008Q4	0.04	0.28	0.16
1991Q2-1992Q1	-1.99	-0.13	-0.80	2009Q1		-0.60	-0.60
1992Q2-1992Q3	1.19	1.41	1.30	2009Q2			0.67
1992Q4		-0.54	-0.54	2009Q3-2009Q4	-0.15	-0.13	-0.14
1993Q1		0.31	0.31	2010Q1		0.76	0.76
1993Q2-1995Q2	-1.03	-0.03	-0.51	2010Q2-2010Q3	-0.33	-0.04	-0.19
1995Q3-1996Q1	0.14	0.64	0.35	2010Q4		0.19	0.19
1996Q2-1996Q3	-0.89	-0.67	-0.78	2011Q1		-0.72	-0.72
1996Q4-1998Q3	0.03	1.93	0.55	2011Q2-2012Q1	0.12	3.28	1.01
1998Q4-1999Q1	-2.46	-0.06	-1.26	2012Q2-2013Q1	-6.95	-0.75	-2.44
1999Q2-2000Q1	0.41	1.60	0.92	2013Q2-2013Q3	0.67	2.00	1.33
2000Q2		-0.26	-0.26	2013Q4		-0.23	-0.23
2000Q3		0.11	0.11	2014Q1-2014Q2	0.18	1.18	0.68

The misalignment series generated by the BEER method as presented in Table 4.15 shows some remarkable dynamics in terms of degree of occurrence of misalignment. For instance, the longest period of misalignment occurred in just 9 quarters (1993:Q2-1995:Q2) with an average and maximum undervaluation of -0.51 and -0.03 respectively. The highest misalignment occurs between 2011:Q2-2012:Q1 with an average of 1.10% and a maximum of 3.23%. The actual exchange rate was close to its equilibrium in 1984:Q2 and 2000:Q4 and Q3. The duration of misalignment uner the BEER is short is short with about 18 episodes of either overvaluation or undervaluation, the series plot for misalignment generated by the BEER method is presented in figure 9.

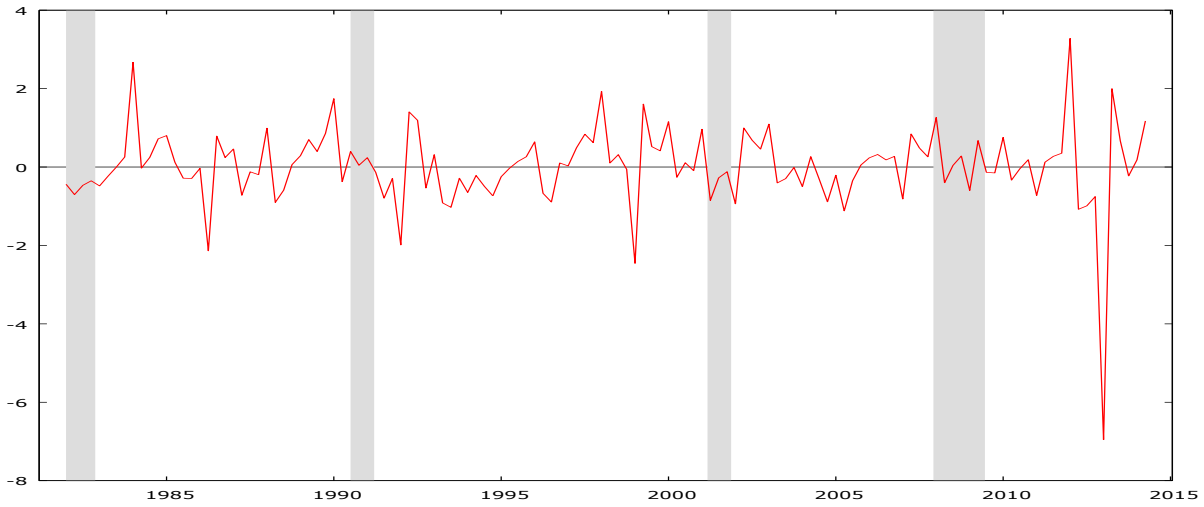


Figure 9: *Exchange Rate Misalignment Series Generated by the BEER Methodology*

The descriptive statistics used for variables in the model which includes all the misalignment series computed from the fundamental equilibrium exchange rate (FEER), behavioural equilibrium exchange rate (BEER), structural vector auto regression model (SVAR) and the natural equilibrium exchange rate (NATREX) and the macroeconomic variables like the non-oil export (NOX), GDP growth rate and current account to GDP ratio (CAGDP) presented in Table 4.16. The descriptive series statistics reported do not display any unusual features with regard to series

distribution. The average of the MISALNATREX, MISALSVAR, MISALFEER and MISALBEER are approximately 0.339, 0.009, -0.039 and 0.004 respectively. The series ranges from 15.40, -2.00, -4.89, -1.19 to 16.03, 2.16, 3.31 and 0.78 with a standard deviation of 7.80, 0.66, 1.37 and 0.38 for MISALNATREX, MISALSVAR, MISALFEER and MISALBEER suggesting that the dispersion around their average is relatively wide. The negative skewness value of -0.05, -0.78, -0.38 for MISALNATREX, MISALFEER and MISALBEER suggest that on the average there are more undervaluation compared to overvaluation and thus have a longer left tail, while for MISALSVAR there are more overvaluation than undervaluation. Likewise, kurtosis that measures the peakedness or flatness of the series distribution is greater than 3 in most of the series, which is suggestive that the peaked to the surface or leptokurtic relative to the normal distribution.

Table 4.16 Descriptive Statistics for the Moving Average (MA)of Misalignment Series and Macroeconomic Variables.

	MISALNATREX	MISALSVAR	MISALFEER	MISALBEER	GR	CAGDP	NOX
Mean	0.339251	0.009096	-0.038946	0.004443	2.015487	20.30669	0.450496
Median	1.877631	-0.021006	0.097357	0.015818	1.981387	13.17718	0.480920
Maximum	16.03479	2.162000	3.305066	0.777630	2.384647	128.5208	0.933409
Minimum	-15.40375	-2.002294	-4.887304	-1.185778	1.756161	-24.63874	-0.049931
Std. Dev.	7.796888	0.659884	1.371510	0.380458	0.176623	34.22021	0.250572
Skewness	-0.046328	0.237477	-0.783773	-0.376680	0.424233	1.382771	-0.270486
Kurtosis	2.445022	4.692144	4.789179	3.425485	2.146330	4.629540	2.286701
Jarque-Bera	1.675267	16.34560	29.94216	3.961284	7.665762	54.52334	4.240992
Probability	0.432733	0.000282	0.000000	0.137981	0.021647	0.000000	0.119972
Observations	127	127	127	127	127	127	127

The correlation matrix presented in Table 4.17 shows that positive as well as negative correlations exist among most of the variables; some with high correlation while some with low correlation. For example, there is high positive correlation between GDP and NOX as well as CAGDP (72 and 47 percent respectively). There is positive correlation between the misalignment series except for the correlation between MISALSVAR/MISALBEER, MISALNATREX/MISAFEER and MISALVAR/MISALNATREX.

Table 4.17 Correlation Coefficient of MA of variables in the Model

	MISALBEER	MISALFEER	MISALNATREX	MISALSVAR	NOX	CAGDP	GDP
MISALBEER	1.000000						
MISALFEER	0.151550	1.000000					
MISALNATREX	0.357379	-0.127264	1.000000				
MISALSVAR	-0.189842	0.237085	-0.471419	1.000000			
NOX	-0.001085	-0.285892	-0.355308	-0.133484	1.000000		
CAGDP	0.025620	0.009877	0.015136	-0.042317	0.339019	1.000000	
GDP	-0.170088	-0.066913	-0.352204	-0.068745	0.727353	0.468549	1.000000

The correlation between the various measures of misalignment and the macroeconomic variables in question shows that there is negative relationship between all the measures of misalignment and the growth rate of GDP as well as non-oil export (NOX). However, there is negative correlation between MISALVAR and CAGDP, while the correlation is positive for other misalignment series. It can be seen easily that the misalignment results obtained from different models (see Figure 10) are different. For example, at the beginning of the study period while it was undervaluation for BEER model, NATREX was slightly close to equilibrium while the SVAR and the FEER are overvalued (above the equilibrium line). Given the above different misalignments from the four models, we wonder which model's finding is more plausible.One way to judge whether a model's finding is more plausible than the other is to see how close the calculated equilibrium RER is to its actual value (RER) or the predictive ability of the model. This can be done by using the following two statistics: root mean squared error (RMSE)[8] and mean absolute error (MAE). The two statistics have been used in the seminal paper by Meese and Rogoff (1983).

[8]Extant tests designed to assess the marginal predictive ability of one model against another are based, generally speaking, on a comparison of the forecast loss function from one model to the other. Such is the approach proposed by the popular Diebold and Mariano (1995) and West (1996) frameworks and subsequent literature, with the usual choice of loss function being the root-mean squared error (RMSE)

Table 4.18 Model Evaluation Statistics

	BEER	FEER	NATREX	SVAR
RMSE	0.0636	3.9883	0.0809	0.0365
MAE	0.0492	3.7586	0.0651	0.0213

From the model selection criteria for this study the SVAR approach to understanding exchange rate misalignment seem to be the lowest in terms of both the RMSE and MAE. This implies that the misalignment series generated through the SVAR approach will constitute the guidepost in achieving the objectives of looking at the effect of exchange rate misalignment on key macroeconomic variables.

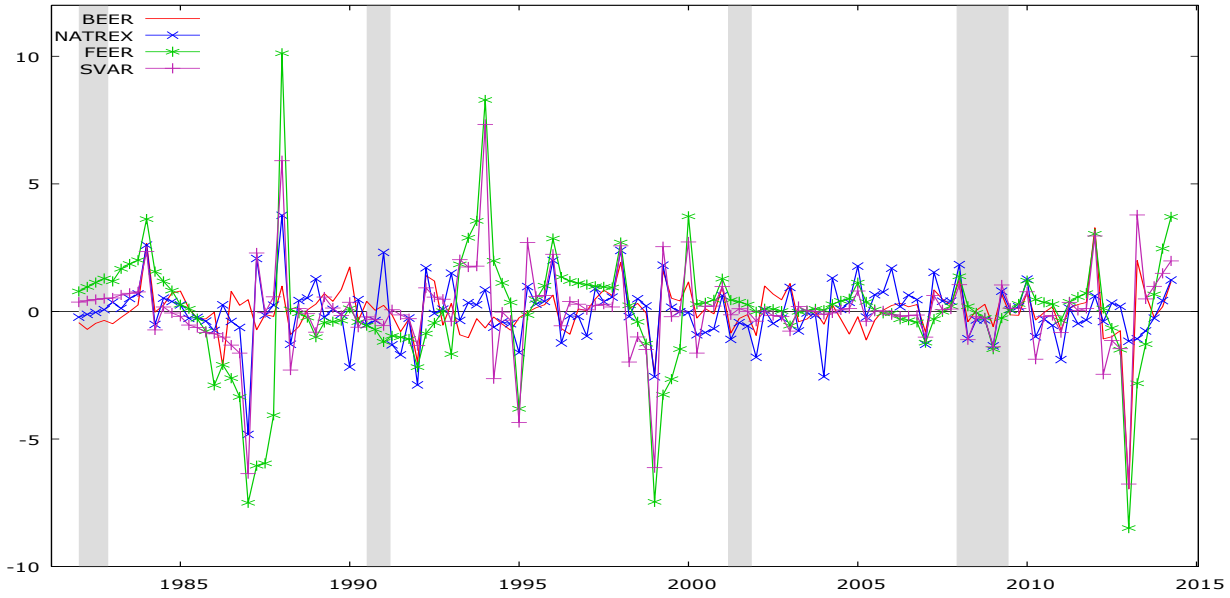


Figure 10. Misalignment Series Generated by the BEER/SVAR/NATREX and FEER

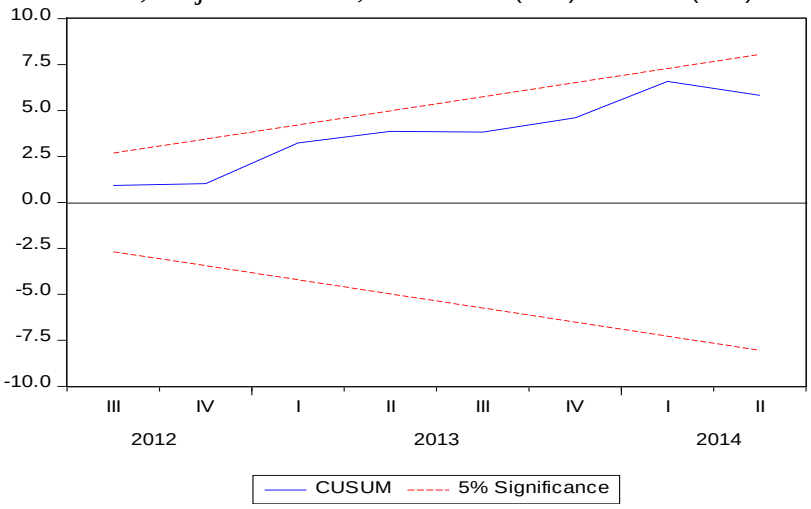
4.2: Non-Oil Export and Real Exchange Rate Misalignment

However, we started by estimating the non-oil export-misalignment regression for the entire study period (1981q4-2014q2) accounting for structural break. The final parsimonious model for the non-oil export regression presented in equation 4.1.Based on the signs and magnitudes of the estimated coefficients (equation 4.1) which indicate that the variables in the non-oil export equation carry their apriori signs. As expected, the positive and significant relationship between the REER and non-oil export performance reveals that other things being equal, one percent

appreciation (depreciation) of real effective exchange rate leads to 6percent decrease (increase) in non-oil export in the short run. FDI is positive which tend to support the hypothesis that FDI could be a veritable engine to higher short run changes in non-oil export growth. This is due to the fact that FDI are in better position to overcome fixed cost, cover sunk cost as well as having knowledge and experience in penetrating foreign market.

$$\Delta(NX)_t = \underset{0.00}{1.30}\Delta(NX)_{t-1} + \underset{0.15}{0.17}\Delta(NX)_{t-2} - \underset{0.00}{0.31}\Delta(NX)_{t-3} - \underset{0.05}{0.01}\Delta(MISALSVAR)_{t-2} + \underset{0.08}{0.10}\Delta(FDI)_{t-2} + \underset{0.62}{0.07}\Delta(EP)_{t-3} - \underset{0.83}{0.02}\Delta(OILGDP)_{t-1} - \underset{0.08}{0.05}\Delta(OILGDP)_{t-3} + \underset{0.04}{0.10}\Delta(REER)_{t-2} - \underset{0.02}{0.44}\Delta(ECM)_{t-1} + \underset{0.01}{0.14}D1993 - \underset{0.21}{0.07}D1994 - \underset{0.04}{0.03}D2008 - \underset{0.63}{0.02}D2012 - \underset{0.57}{0.17}C \quad \textbf{4.1}$$

$R^2 = 0.90$, Adj. $R^2 = 0.89$, RESET=2.29(0.02) LM=0.72(0.49) ARCH=0.02(0.90) , DW=1.98



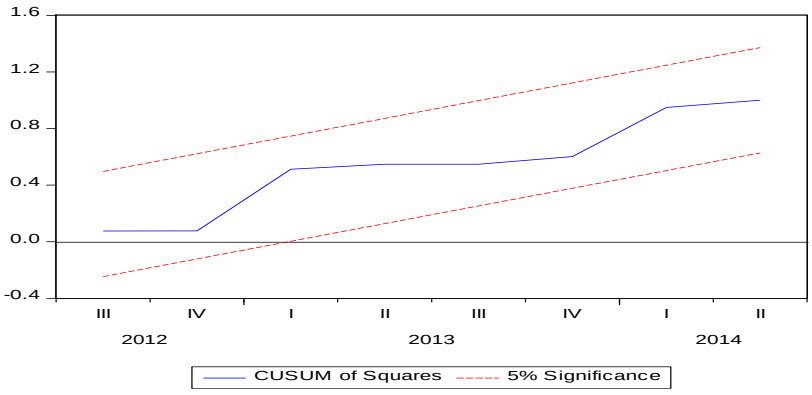


Figure 11: CUSUM and CUSUM of Squares plot for Non-Oil Export and Exchange Rate Misalignment

The negative relationship that exists between REER misalignment and non-oil export is not surprising because real overvaluation could adversely affect a country's export performance via loss in competitiveness. The positive relation between the proxy of infrastructure and non-oil export is in line with the aprio ri expectation as improvement in infrastructural facilities like electricity supply will significantly boost activities in the non-oil sector. The value of the parameter of error correction term is -0.44 (equation 4.1), measures the speed of adjustment, in other words, it measures the speed with which the Non-oil export return to its long run equilibrium value. This suggests that the disequilibrium will be corrected in about 6 quarters provided that there are no further shocks[9]. An error correction model offers an alternative test of causality or weak exogeneity, which is not picked up, by the traditional Granger causality test Anaman and Mahmod (2003). Since the coefficient of the error correction term was statistically significant, this implied that the variables were cointegrated and the dependent variable was endogenous.

The oil to GDP ratio which is used to proxy the effect of the activities of oil on non-oil sector, or 'Dutch disease' effect is negative and significant indicating a short run effect of oil sector activities on non-oil sector. In other words, Dutch disease involves slow growth of economic sectors other than the oil or energy sector. It is often characterized by overvaluation of the domestic currency, wage distortions, and rent-seeking activities as countries rich in particular resources exploit these resources for the short-term benefits, neglecting development of other primary and secondary economic sectors (Gylfason 1999; Lane and Tornell 1996 cited in Anaman and Mahmod, 2003). The evaluation statistics as indicated underneath equation 4.1, shows that the model is a best fit and

[9]The time required to dissipate x% of a shock is determined according to $(1-\beta)^t = (1-x)$, where t is the number of years and β is the absolute value of the speed of adjustment parameter (Baffes et al., 1997 Cited in Sanusi, 2009)

does not suffer from autocorrelation, heteroschedasticity etc. The stability property of the short run dynamic model as presented in the figure below equation 4.1 shows that the recursive residual lies within the ± 2 standard error bounds as indicated in the CUSUM and the CUSUM of squares plot in Figure 11.

Non-Oil Export, Exchange Rate Overvaluation and Undervaluation

To evaluate the separate effect of overvaluation and undervaluation, this study use dummy variable for two separate regression. For the first regression, the dummy variable (*OV*) takes the value 1 for positive values representing overvaluation and 0 otherwise. The second regression estimate non-oil export-undervaluation nexus, the dummy variable (*UN*) takes the value of 1 for negative values in the misalignment series representing undervaluation and 0 otherwise. Structural breaks in the data are accounted for from the general model to the parsimonious model in both regressions.

Non-Oil Export and Exchange Rate Overvaluation

$$\Delta(NX)_t = \underset{0.00}{1.44}\Delta(NX)_{t-1} + \underset{0.16}{0.16}\Delta(NX)_{t-2} - \underset{0.00}{0.26}\Delta(NX)_{t-3} - \underset{010}{0.04}\Delta(MISALSVAR^{*}OV)_{t-1} - \underset{0.70}{0.13}\Delta(EP)_{t-2} + \underset{0.06}{0.14}\Delta(EP)_t + \underset{0.04}{0.08}\Delta(FDI)_{t-1} + \underset{0.12}{0.26}\Delta(OILGDP)_t - \underset{0.09}{0.29}\Delta(OILGDP)_{t-1} + \underset{0.05}{0.16}\Delta(REER)_{t-3} - \underset{0.01}{0.59}\Delta(ECM)_{t-1} + \underset{0.68}{0.01}D1997 + \underset{0.09}{0.07}D1992 - \underset{0.34}{0.05}D2010 - \underset{0.74}{0.02}D2012 - \underset{0.04}{0.50}C \quad \textbf{4.2}$$

$R^2 = 0.90$, Adj.$R^2 = 0.89$ LM=1.26(0.28), ARCH=0.08(0.77) RESET=0.37(0.54) DW=1.94

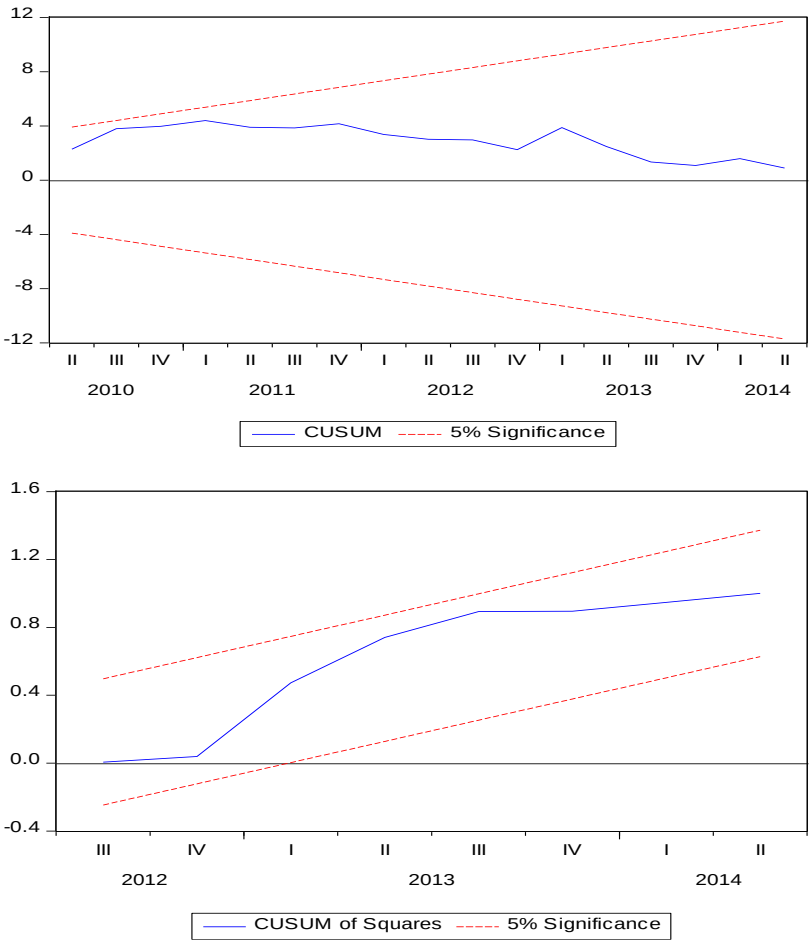


Figure 12: CUSUM and CUSUM of Squares plot for Non-Oil Export and Exchange Rate Overvaluation

4.2.2 Non-Oil Export and Exchange Rate Undervaluation

$$\Delta(NX)_t = \underset{0.00}{0.16\Delta(NX)_{t-1}} + \underset{0.12}{0.17\Delta(NX)_{t-2}} - \underset{0.00}{0.30\Delta(NX)_{t-3}} - \underset{0.29}{0.01\Delta(MISALSVAR)_{t-1}} +$$

$$\underset{0.07}{0.02\Delta(MISALSVAR^{*}UN)_{t-1}} + \underset{0.04}{0.11\Delta(FDI)_{t-1}} + \underset{0.10}{0.26\Delta(EP)_t} + \underset{0.18}{0.10\Delta(OILGDP)_t} - \underset{0.05}{0.05\Delta(OILGDP)_{t-3}} +$$

$$\underset{0.00}{0.29\Delta(REER)_{t-1}} - \underset{0.00}{0.85\Delta(ECM)_{t-1}} + \underset{0.42}{0.02D1998} + \underset{0.00}{0.16D1992} - \underset{0.00}{0.71C} \quad \textbf{4.3}$$

$R^2 = 0.90$, Adj.$R^2 = 0.89$ LM=1.47(0.23), ARCH=0.15(0.70), RESET=1.32(0.11) DW=1.89

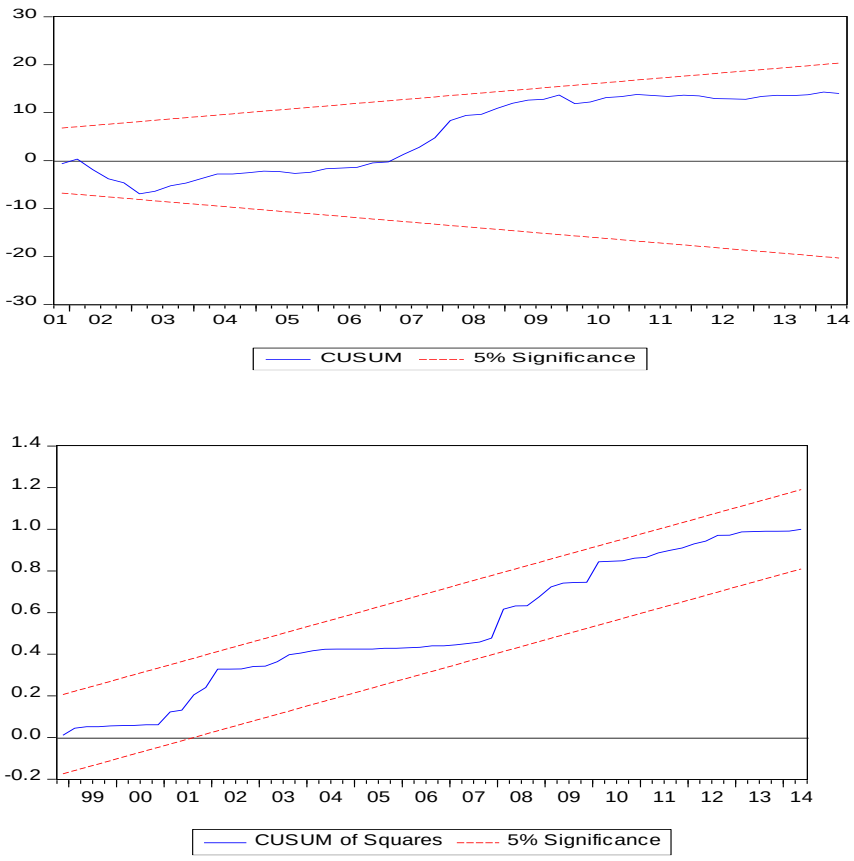


Figure 13: CUSUM and CUSUM of Squares plot for Non-Oil Export and Exchange Rate Undervaluation

The short-run model shows how adjustments take place among various variables to restore equilibrium to the long run in response to short term disturbance in the non-oil export equation. The negative and significant sign of the lagged error-correction term (ECM) shows that whenever there is a gap between no-oil export and its equilibrium level occasioned by either overvaluation or undervaluation, the actual non-oil export will tend to converge to its equilibrium. The magnitudes of the error correction term in equation 4.2 is (-0.59) which means it takes about 1.1 year or about 4 quarters for the disequilibrium to be corrected as a result of overvaluation. The result also shows that 1 percent overvaluation leads to 4 percent decline in non-oil export. The result also shows that the activities of the oil sector (*OILGDP*) had the highest impact on non-oil

export, in other words, 1 percent activity in the oil sector negatively affect the non-oil export by 29 percent. Both the proxy for infrastructure and FDI positively affect the non-oil export.

Similarly, the non-oil export-undervaluation nexus suggests that adjustments take place among various variables to restore equilibrium to the long run in response to short term disturbance in the non-oil export-undervaluation nexus. In other words, the value of the ECM (-0.85) in equation 4.3 shows that the disequilibrium as a result undervaluation will be corrected 0.5 year or (1.5 quarters) provided that there are no further shocks. From the result also, 1 percent undervaluation will result to increase in non-oil export by 2 percent. The proxy for infrastructure and FDI positively affect non-oil export as expected while the value of *OILGDP* shows evidence of Dutch-Disease.

In summary, the result in both specifications supports the view of the disequilibrium approach by the positive and significant value of the misalignment) undervaluation coefficient (*MISAL*) (Sekkat, 2015). This view emanated from the tremendous success recorded in the last few years by China and other East Asian countries and the ensuing debate about the undervaluation of the Chinese Renminbi. The negative and significant coefficient of overvaluation as presented in equation **4.2**shows that it negatively affect non-oil export performance, this is possible through its effect on precipitating inflationary pressures which has long term effect on competitiveness and growth (Jongwanich, 2009; Fic, Barrel and Holland, 2008). Grobar (1993) and Sekkat and Varoudakis (2000) among others showed that exchange rate overvaluation decrease the ratio of manufactured exports to GDP; which can reduce exports diversification. However, in both specifications, the proxy for 'Dutch Disease' oil to gdp ratio indicates that it negatively affect non-oil export performance. The model adequacy test indicated underneath equation **4.2** and **4.3**shows no serious problem of specification error as indicated by LM test, ARCH test etc. The stability test

presented by the CUSUM and CUSUM of Squares plot in Figure 12 and 13 suggest that our parameters are stable.

4.2.3 Non-oil Export, Exchange Rate Misalignment and Exchange Rate Regime

To check the probable effect of policy shift and contribute to the debate about the role of exchange rate regime in precipitating exchange rate misalignment and its implication on non-oil export. Practically, we created a dummy variable which takes the value of zero for years of fixed exchange rate regime and one otherwise. In other words, the period between 1981Q4 to 1986Q4 equal 0 and 1 otherwise (1987Q1 to 2014Q2) for flexible exchange rate regime, while for fixed exchange rate regime, 1981Q1 to 1986Q4 takes the value 1 and 0 otherwise (1987Q1 to 2014Q2). Then, we interact the dummy with misalignment series to see the possible effect of flexible exchange rate regime on misalignment series as it affects the non-oil export. If the switch from fixed to flexible exchange rate inhibits growth in non-oil export, the interaction between misalignment and dummy variable is expected to be negative. The ensuing parsimonious model with dummy interaction for both fixed and flexible exchange rate regimes are as follows:

Flexible Exchange Rate Regime, Exchange Rate Misalignment and Non-Oil Export

$$\Delta(NX)_t = \underset{0.00}{1.45}\Delta(NX)_{t-1} - \underset{0.00}{0.33}(NX)_{t-3} + \underset{0.17}{0.12}\Delta(NX)_{t-4} - \underset{0.07}{0.03}\Delta(MISALSVAR^{*}DUMMY)_{t-4} + \underset{0.04}{0.10}(FDI)_t + \underset{0.11}{0.24}(EP)_t - \underset{0.78}{0.02}\Delta(OILGDP)_t + \underset{0.07}{0.16}\Delta(REER)_{t-3} - \underset{0.01}{0.50}(ECM)_{t-1} + \underset{0.00}{0,13}D2001 - \underset{0.07}{0.06}D2002 - \underset{0.49}{0.20}C \quad \textbf{4.4}$$

$R^2 = 0.90$, Adj. $R^2 = 0.89$, RESET=3.33(0.00) LM=2.02(0.14) ARCH=0.12(0.73) , DW=2.21

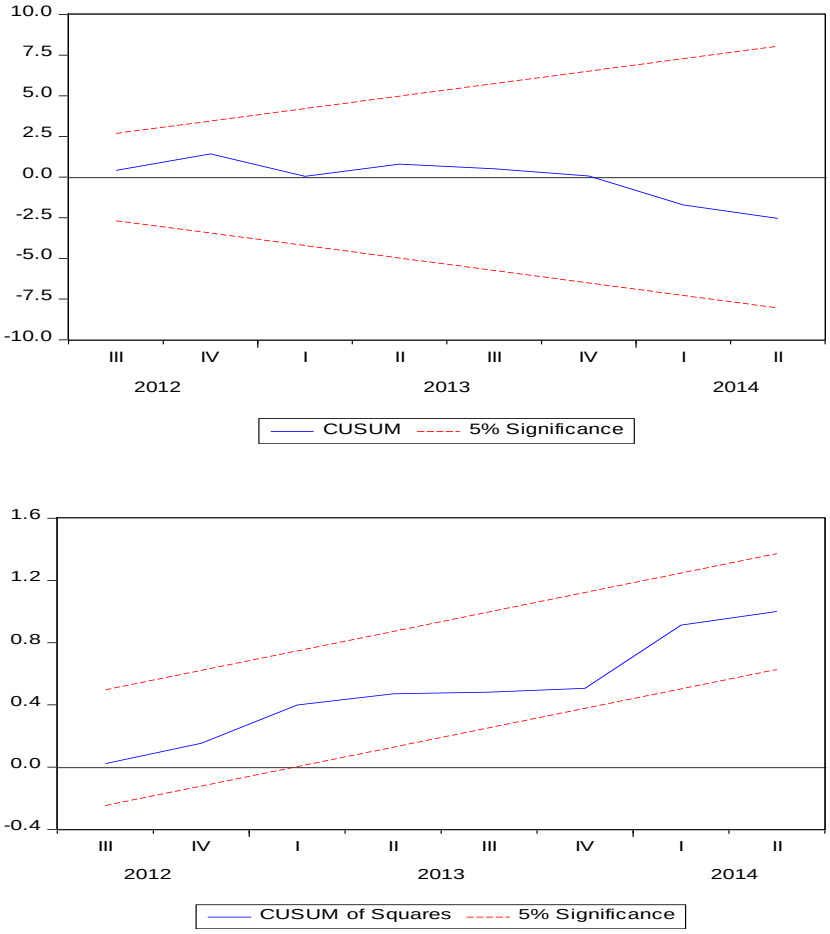


Figure 14: CUSUM and CUSUM of Squares plot for Non-Oil Export and Flexible Exchange Rate Regime

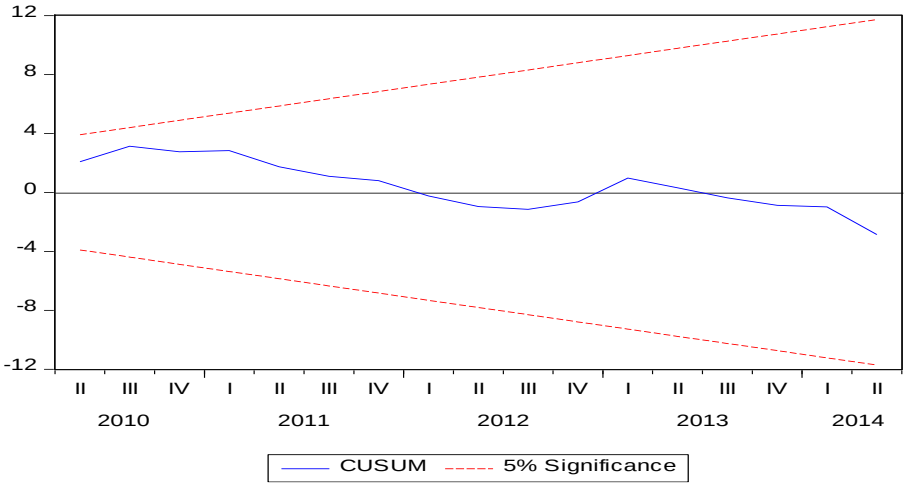
The result above indicated that in the short run, the interaction of the dummy variable and misalignment is negative implying that flexible exchange rate regime is associated with more volatile misalignment than the fixed exchange rate regime which negatively affects non-oil export. This is due to the fact that the switch to a more flexible exchange rate precipitated inflationary pressures due to supply bottle neck that characterized the periods post deregulation of the foreign exchange market. This result is in line with Dubas (2009) who showed that misalignment is the most marked in developing countries and that free floating leads to much more misalignment. The proxy for 'Dutch Disease' also shows negative relationship with non-oil export, as noted by Ebrahim-Zadeh (2003), the weakening of the competitiveness of the traditional tradable sector is

irrespective of the exchange rate regime the country operates. This is because either way (fixed or floating) the REER appreciates. The error correction term (-0.5) suggest that disequilibrium can be corrected in about one and half year (5 quarters) provided that there are no further shock to the system. The diagnostic test reported below equation 4.4 shows that the models does not suggest any major specification problems, also, the CUSUM and the CUSUM of Squares plots in Figure 14 indicates stability of our parameter estimate.

Fixed Exchange Rate Regime, Exchange Rate Misalignment and Non-Oil Export

$$\Delta(NX)_t = \underset{0.00}{1.91}\Delta(NX)_{t-1} + \underset{0.14}{0.16}\Delta(0.16)_{t-2} - \underset{0.00}{0.29}\Delta(NX)_{t-3} - \underset{0.09}{0.01}\Delta(MISALSVAR^{*}DUMMY)_{t-1} + \underset{0.05}{0.12}\Delta(FDI)_{t-1} + \underset{0.07}{0.34}\Delta(EP)_{t-1} - \underset{0.52}{0.07}\Delta(OILGDP)_{t-1} - \underset{0.87}{0.02}\Delta(OILGDP)_{t-3} + \underset{0.00}{0.35}\Delta(REER)_{t-1} - \underset{0.00}{1.10}(ECM)_{t-1} + \underset{0.00}{0.17}D1992 - \underset{0.98}{0.00}D2005 - \underset{0.06}{0.09}D2010 - \underset{0.13}{0.63}C \quad \mathbf{4.5}$$

$R^2 = 0.91$, Adj. $R^2 = 0.89$, RESET=2.69(0.01) LM=1.55(0.21) ARCH=0.20(0.66) , DW=1.88



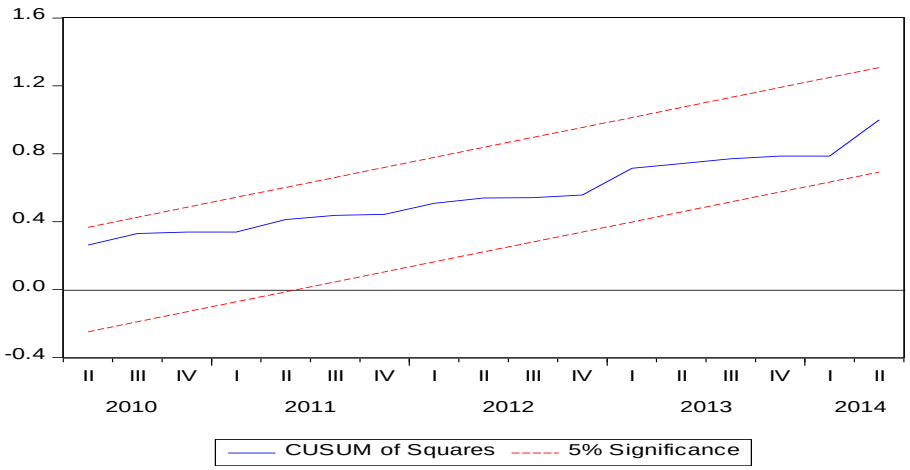


Figure 15: CUSUM and CUSUM of Squares plot for Non-Oil Export and Fixed Exchange Rate Regime

The result from equation 4.5 shows that the model does not suffer from any specification problem as indicated below the equation, the CUSUM and CUSUM of squares plot indicates that the parameters are stable. The error correction term (-1.10)implies that instead of monotonically converging to the equilibrium path directly, the error correction process fluctuates around the long-run value in a dampening manner. However, once this process is complete, convergence to the equilibrium path is rapid[10]. The result also shows that 1 percent misalignment during the fixed exchange rate regime will lead to 1 percent fall in non-oil export, compared to the result under flexible exchange rate system it seems less destructive. Although, misalignment situation can be corrected within a shorter period under flexible exchange rate compared to fixed exchange rate regime.

4.3 Exchange Rate Misalignment and Economic Growth

The Nigerian economy has experienced major political and economic changes in recent decades. The instability of the naira posed serious challenges to policy makers who have made several

[10]The interpretation for error correction term between -1 and -2 can be found in Narayan and Smyth (2006); Loayza and Ranciere, (2005). Loayza and Ranciere noted that the coefficient of error correction term that is negative and not lower than -2 lies within the unit circle

attempt to stabilize the naira. The mounting pressure in the foreign exchange in the form of excess demand for foreign currency has necessitated the need for monetary authority to experiment with various types of exchange rate regime. Thus, the move from fixed to flexible exchange rate regime in 1986 was itself a desperate attempt to resolve the problem of persistent balance of payment. Under such circumstances, if structural breaks are significant but are not accounted for in the empirical models, it could lead to wrong inferences (You and Serantis, 2012). This study conducted unit root test with structural break in the data.Compared with the conventional ADF and PP unit root test, these tests have better power and properties. Potential structural break are therefore an important factor that need to be considered when estimating the impact of exchange rate misalignment on key macroeconomic variables like current account imbalance, growth rate as well as non-oil export. The result for the conventionally used Dickey Fuller and Philip-Perron test without structural break are presented in Table 4.1. In the event of structural break in the data, these traditional test do not take the break into account and lead to false rejection of the null of non-stationarity (Patterson, 2000 cited in Sanusi, 2009).

Table 4.19 Structural Break with Unknown Date

Variables	***Level*** ***Γ-Statistics*** ***Critical Values 1%=-4.95, 5%=-4.44***	***First Difference*** ***Γ-Statistics*** ***Critical Values; 1%=-4.95, 5%=-4.44***
OPP	*-4.3008 (1986Q2)*	*-14.2399 (1987Q1)*
GCON	*-3.3937 (2004Q2)*	*5.7785 (1990Q2)*
TOT	*-3.7888 (2001Q4)*	*-4.6824 (1986Q1)*
MISALSVAR	*-8.2890 (1993Q3)*	*-5.9616 (1986Q3)*
INV	*-3.8913(1993Q1)*	*-5.7252(2002Q2)*
GR	*-6.8404(1996Q4)*	*-28.5799(1991Q1)*

Source: Eviews 9 Output

The result of the traditional test ADF and PP reported in Table 4.1 shows that the null hypothesis of a unit root cannot be rejected for all the variables at levels suggesting that they are integrated of order one *I(1)* with the exception of growth rate in GDP and misalignment series (*MISALSVAR*).

Next we conducted Dickey Fuller test with structural break with a known and unknown date, as can be seen from Table 4.19 the result with an unknown structural break seems to conform to the traditional Dickey Fuller and Philip-Perron which reinforce our conclusion about the level of integration of our variables. Although the break date of some of the variables shows some discernable pattern with regards to changing dynamics in the country's policy environment. For instance, the openness variable showed a break in 1986Q2 and 1987Q1which marked a paradigm shift from fixed to flexible exchange rate in Nigeria. Other variables like *TOT* and *MISALSVAR*break in this period reinforcing the need to account for such shift in the data. Although, these estimate needed to be treated with caution as they merely determine whether there is a break or not (Maddala and Kim, 1998 cited in Sanusi, 2008).

Table 4.20 Structural Break with Known Date (1987Q1)

Variables	***First Difference*** ***Γ-Statistics*** ***Critical Values (Lane et al. 2002)*** ***1%=-3.55 5%= -3.03***
MISALVAR	*-6.6175*
GCON	*-3.3068*
OPP	*-3.1186*
INV	*-4.8065*
GR	*-9.0232*
TOT	*-4.8639*

Source: JMulTi Econometrics Software

The result of the unit root test with the break assumed to be in 1987Q1 are in line with the result of the conventional test, the result is based on the critical values of lane et al. (2002). This informed our decision about the break date assumed to 1987Q1 which the beginning of flexible exchange rate system in Nigeria.

4.3.1 Exchange Rate Misalignment and Exchange Rate Regime

A short run dynamic model is required for the estimation of growth regression since our misalignment series (*MSALSVAR*) and growth (*GR*) are stationary at levels while others are

integrated of order one *I(1)* series. We specified an error correction term for the growth equation following Engle and Granger procedure by using by using the one period lag of the residuals from their estimated long run equation as the error correction term (ECT_{t-1}). We allow for up to 4 lags for all the variables, and included dummy. Firstly, we estimated a general form of the form

$$a(L)\Delta Ingr = b(L)\Delta Z + \theta.ECM_{-1} + \mu \qquad \textbf{4.5}$$

Where Z is a vector of predetermined and exogenous variables and ECM is the error correction term obtained from the residual of the long run static equation, μ is the disturbance term, θ is the adjustment parameter, $a(L)$ and $b(L)$ are the lag polynomials while Δ implies the first difference term. The estimation of equation 4.5 is done using General-to-Specific (GETS) procedure by successively excluding variables that are statistically insignificant using the variable deletion test.However, we started by estimating the growth-misalignment regression for the entire study period (1981q4-2014q2) without accounting for structural break. The final parsimonious model for the growth regression is given below

$$\Delta(gr)_t = \underset{(0.00)}{0.67\Delta(gr)_{t-4}} + \underset{(0.44)}{3.96\Delta(inv)_{t-1}} - \underset{(0.04)}{0.25\Delta(misalsvar)_{t-2}} + \underset{(0.72)}{0.72\Delta(opp)_{t-1}} -$$

$$\underset{(0.08)}{0.00\Delta(tot)_t} + \underset{(0.00)}{14.05\Delta(gcon)_{t-1}} - \underset{(0.00)}{1.11\Delta(ecm)_{t-1}} - \underset{(0.00)}{29.73(c)} \qquad \textbf{4.6}$$

$R^2 = 0.89$, Adj. $R^2 = 0.88$, RESET=0.29(0.59) LM=0.52(0.60) ARCH=0.14(0.71) , DW=1.88

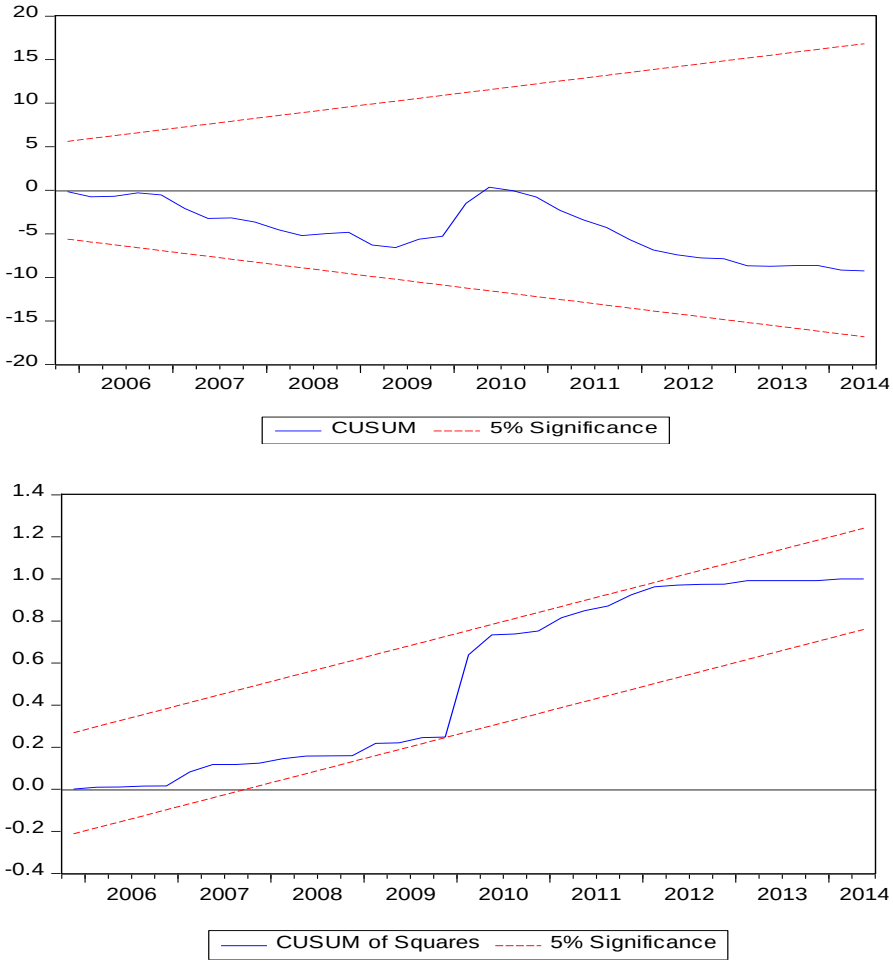


Figure 16: CUSUM and CUSUM of Squares plot for Economic growth and Exchange Rate Misalignment

The result equation 4.6 suggested that investment exerted a positive but insignificant impact on growth. Also, in the short run, exchange rate misalignment will exert a negative impact on growth rate of GDP. In other words, 1.0 percent of real exchange rate misalignment will negatively impact growth with about 25 percent. The result also indicated that in the short run, changes in one period lag of openness and government consumption expenditure positively impact on growth, although, the openness indicator is not significant. The terms of trade (*tot*) coefficient is negative and significant at 10 per cent indicating an unfavorable terms of trade following the volatility in oil

price. The probability values are shown in parentheses beneath the estimated coefficients. The diagnostic test statistics suggested that the models are well specified. The Breusch-Godfrey Lagrange Multiplier (LM) test for autocorrelation does not indicate any problems concerning autocorrelation. The Ramsy RESET test also suggests that the model have the correct functional form, the CUSUM test examine the stability property of our short run dynamic model, the result as indicated in the CUSUM and CUSUM of Squares plot shows that the parameters are stable Figure 16. The error correction mechanism$(ecm)_{t-1}$ which captured the long run adjustment process met all its condition. In other words, the $(ecm)_{t-1}$measures the speed of adjustment to equilibrium when there was a shock and thus, the value (-1.11) implies that instead of monotonically converging to the equilibrium path directly, the error correction process fluctuates around the long-runvalue in a dampening manner. However, once this process is complete, convergence to the equilibrium path is rapid.

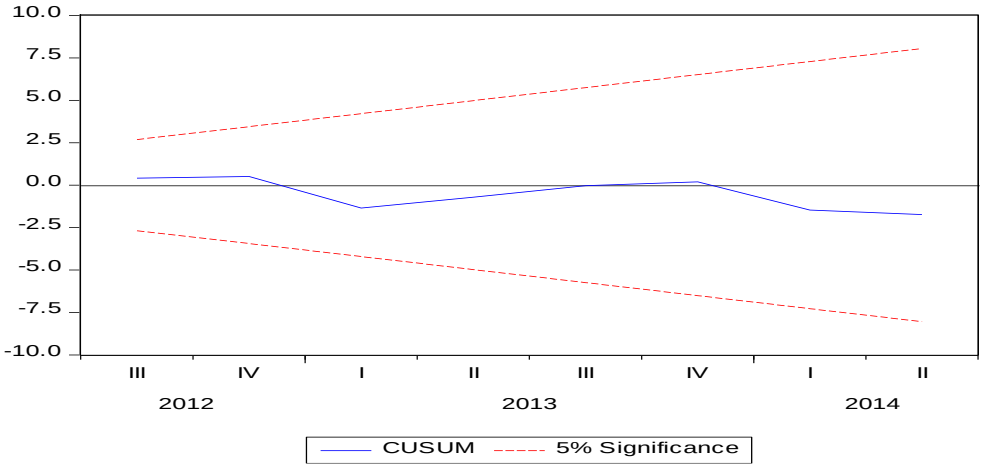
Empirically, it is not a priori clear which of the regimes induces more misalignment. Under a flexible regime the exchange market determines the appropriate level of the nominal exchange rate. Hence, the RER misalignment is, at worst, only temporary. In contrast, the fact that under fixed regimes nominal exchange rates cannot be adjusted induces the risk of pervasive RER misalignment. However, if goods markets are perfectly efficient, prices could respond to market pressures and bring back the RER to its equilibrium level even if the nominal exchange rate does not change (Nouira, 2015). Although, empirical findings have shown that irrespective of the exchange rate regime, real exchange rate can be misaligned in both fixed and flexible exchange rate regime (Coudert et al., 2013; Nouira, 2011). For instance, under fixed exchange rate regime, it might be the result of nominal price stickiness (Engel, 2010) while it is as a result of incomplete

information or 'herd instinct' among investors under flexible exchange rate regime (Edwards, 2011).

To check for the importance of distinguishing between the probable effect of policy shift and contribute to the debate about the role of exchange rate regime in precipitating misalignment. Practically, we created a dummy variable which takes the value of zero for years of fixed exchange rate regime and one otherwise. In other words, the period between 1981Q4 to 1986Q4 equal 0 and 1 otherwise (1987Q1 to 2014Q2). Then, we interact the dummy with misalignment series to see the possible effect of flexible exchange rate regime on misalignment series. If the switch from fixed to flexible exchange rate inhibits growth, the interaction between misalignment and dummy variable is expected to be negative. The variables D1991, D2004 is to account for structural breaks in our general model to arrive at a parsimonious model. The ensuing parsimonious model from the estimation of eq 4.1 with dummy interaction is as follows

$$\Delta(GR)_t = \underset{0.00}{0.62}\Delta(GR)_{t-2} + \underset{0.00}{7.18}\Delta(INV)_{t-2} _ \underset{0.96}{0.01}\Delta(MISALSVAR * DUMY)_{t-1} _ \underset{0.81}{0.22}(DUMY) + \underset{0.10}{3.57}\Delta(TOT)_{t-1} + \underset{0.00}{15.48}\Delta(GCON)_{t-1} _ \underset{0.00}{1.15}(ECM)_{t-1} _ \underset{0.55}{D1991} _ \underset{0.88}{D2004} _ \underset{0.00}{33.85}C \quad \textbf{4.7}$$

$R^2 = 0.90$, Adj. $R^2 = 0.89$, RESET=1.72(0.09) LM=0.52(0.60) ARCH=0.25(0.62) , DW=1.87



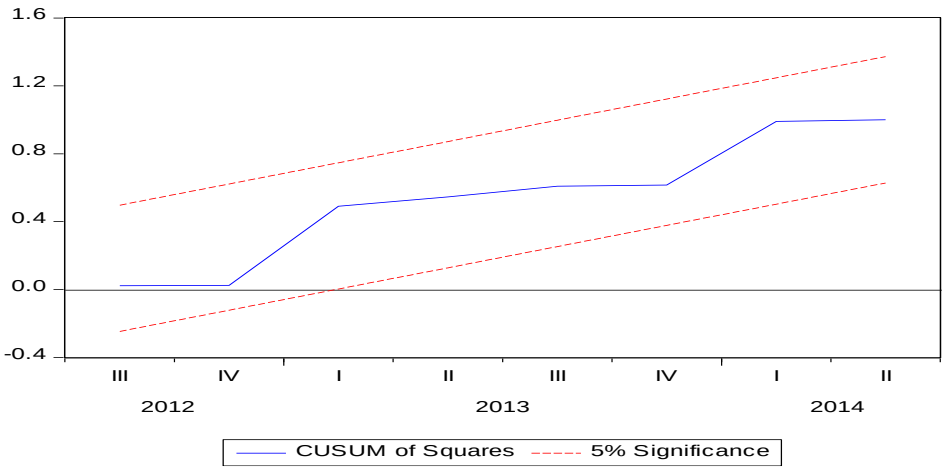


Figure 17: CUSUM and CUSUM of Squares plot for Economic growth and Flexible Exchange Rate Regime

The result above indicated that in the short run, the interaction of the dummy variable and misalignment is negative implying that flexible exchange rate regime is associated with more volatile misalignment than the fixed exchange rate regime. This is due to the fact that the switch to a more flexible exchange rate precipitated inflationary pressures due to supply bottle neck that characterized the periods post deregulation of the foreign exchange market. However, the magnitude of error correction term is (-1.15) implying a high speed of adjustment in the event of shock. In other words, this implies that instead of monotonically converging to the equilibrium path directly, the error correction process fluctuates around the long-runvalue in a dampening manner.

The diagnostic test reported below the models does not suggest any major specification problems as the overall fit of the model was 84 percent. In summary the short run model suggest that short run movement in investment, openness, government consumption expenditure are major determinants of growth. The stability property of the short run dynamic model as indicated in the

CUSUM and CUSUM of squares as indicated in figurebelow equation 4.7 showed that the plot was within the 5 percent significant bound, indicating parameter stability.

Fixed Exchange Rate Regime

To evaluate the impact of fixed exchange rate regime on exchange rate misalignment, one period lag of the residual from the long run equations is used as the error correction term in the short run model. However, Dumy takes the value of 1 for the period 1981:Q1 to 1986:Q4 and 0 otherwise. To ensure stability of our parameters, estimate from the much general model indicated that the period 1991:Q3, 1994:Q4 and 2005:Q3 lie outside the 5 percent bounds indicating that our parameters are not stable. To capture this parameter instability in our ensuing parsimonious model, D1991 takes the value 1 before 1991:Q3 and 0 afterward, D1994 takes the value 1 before 1994:Q4 and 0 afterwards. D2005 takes the value of 1 from 1981:Q1 to 2005:Q2 and 0 afterwards. The parsimonious model is presented in equation 4.8 below.

$$\Delta(GR)_t = \underset{0.00}{0.59}\Delta(GR)_{t-4} + \underset{0.04}{6.13}\Delta(INV)_{t-2} + \underset{0.07}{0.02}\Delta(MISALSVAR * DUMY)_{t-1} + \underset{0.00}{7.85}\Delta(OPP)_{t-1} -$$
$$\underset{0.75}{0.80}\Delta(TOT)_{t-1} + \underset{0.00}{15.94}\Delta(GCON)_{t-2} + \underset{0.25}{1.13}(DUMY) - \underset{0.00}{1.41}\Delta(ECM)_{t-1} - \underset{0.84}{0.18}D1991 + \underset{0.33}{D1994} -$$
$$\underset{0.82}{0.18}D2005 - \underset{0.00}{33.52}C \quad 4.8$$

$R^2 = 0.89$, Adj. $R^2 = 0.88$, RESET=3.29(0.00) LM=0.15(0.85) ARCH=0.49(0.48) , DW=2.02

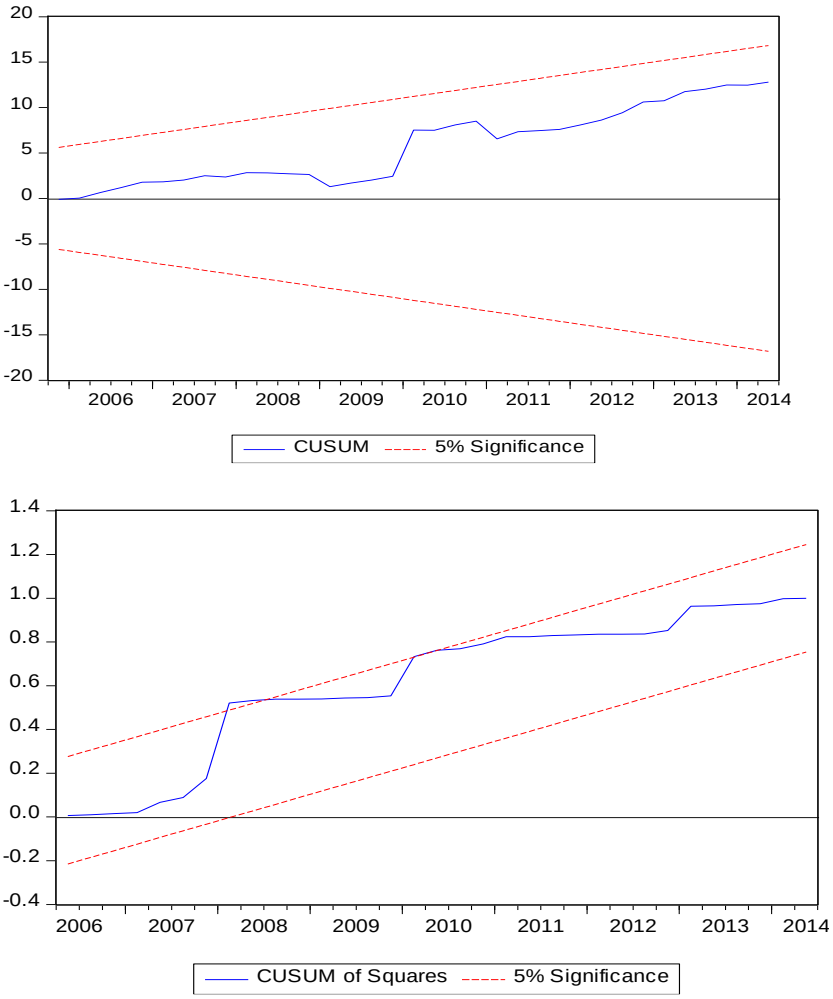


Figure 18: CUSUM and CUSUM of Squares plot for Economic growth and Fixed Exchange Rate Regime

The estimated result for the pre reform sample is presented in equation 4.8, the result indicated that the real exchange rate misalignment variable is positive and significant indicating that fixed exchange rate regime has the tendency to induces less misalignment leading to higher growth trajectory in absolute term, this result is in line with (Nouira, 2015). The result also indicated that the short run, *OPP, GCON* and *INV* are positively signed and significant, this shows that these variables contribute positively to growth. The negative but insignificant TOT variable is not surprising as this period is characterized by negative terms of trade due to development in the international oil market. The magnitude of the error correction term is negative and significant (-1.41) which is less than (-2) which suggest that the error correction process fluctuates around the

long run value in a dampening manner. Also the diagnostic test reported below the model does not suggest any serious specification problem with R-square and adjusted R-square of over 50 percent. Evidence from stability property of the short run dynamics as indicated in the figure below model 4.8 shows that the recursive residuals lies within the ± 2 standard error bound in both the CUSUM and the CUSUM of squares, indicating that our parameters are stable as evident in Figure 18.

4.3.2 Overvaluation and Undervaluation- Growth Nexus

In disentangling the separate effect of overvaluation and undervaluation and growth, the first step in our regression analysis is to use dummy variables to estimate two separate regression for overvaluation and growth. For instance, the growth-undervaluation nexus is estimated by using 1 when the series negative and 0 otherwise since undervaluation is when the series is below the equilibrium line. Also, for the growth-overvaluation nexus, the dummy variable (*OV*) takes the value 1 for positive numbers in the misalignment series and 0 otherwise.

The result for the growth-undervaluation nexus presented in equation 4.10 shows that undervaluation positively affect growth, in other words, real exchange undervaluation will lead to improvement in economic growth outcome, this result is in line with Rodrick (2008). For instance, a 1% increase in misalignment (undervaluation) will lead to 11 percent increases in growth. In the literature, the transmission channel linking undervaluation and growth operates through two channels. These include; the total factor productivity channel and the capital accumulation channel (Mbaye, 2013). The first channel – known as the "capital accumulation channel"– refers to the claim that real exchange rate undervaluation enhances growth through an increase in the stock of capital in the economy. There are two mechanisms through which capital accumulation enhances growth. In the first mechanism, the capital accumulation operates exclusively in the tradable goods sector –whose share in GDP increases (Rodrik, 2008) – while in the second, the stock of capital

increases through the expansion of overall savings and investment (Levy Yeyati and Sturzenegger, 2007; Bhalla, 2008). The second transmission channel of the growth-undervaluation nexus is the "total factor productivity (TFP) growth channel"– places the structure of domestic production at the core of the analysis. A depreciated real exchange rate, equivalent to an increase in the price of tradable goods relative to non-tradables, improves the profitability of the tradable sector. As production responds to the price incentive and moves from the non-tradable to the tradable sector, the overall productivity in the economy increases leading to a booming export sector which ultimately fosters growth.

The result also indicates that in the short run changes *opp, tot, gcon, inv* positively and significantly affects growth. The error correction term is (-1.13) which suggest that the error correction process fluctuates around the long run value in a dampening manner. The diagnostic test reported below the model does not suggest any major specification problems with the model and the overall model fit of 89 percent was observed. The stability test presented in the CUSUM plot and CUSUM of Squares plot suggest that our parameter estimates are stable as evident in Figure 19.

$$\Delta(GR)_t = \underset{0.00}{0.61}\Delta(GR)_{t-4} + \underset{0.00}{5.86}\Delta(INV)_{t-3} + \underset{0.10}{0.19}\Delta(MISALSVAR * UN)_t + \underset{0.00}{4.97}\Delta(OPP)_{t-1} - \underset{0.55}{1.14}\Delta(TOT)_t + \underset{0.00}{14.94}\Delta(GCON)_{t-1} - \underset{0.00}{1.13}(ECM)_{t-1} + \underset{0.09}{0.59}(UN) + \underset{0.05}{1.72}D1990 - \underset{0.30}{0.70}D2008 - \underset{0.00}{32.10}C \quad \textbf{4.10}$$

$R^2 = 0.90$, Adj. $R^2 = 0.89$, RESET=2.54(0.01) LM=0.68(0.51) ARCH=0.45(0.50) , DW=1.93

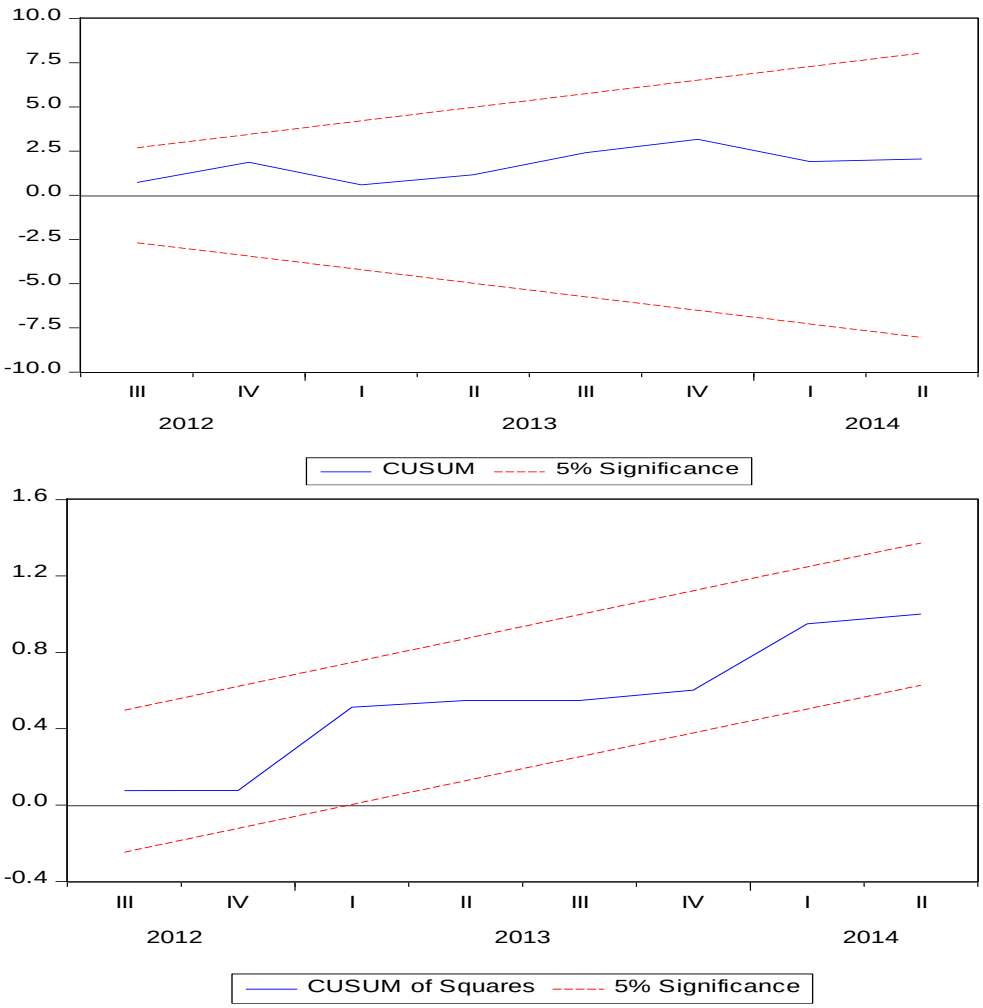


Figure 19: CUSUM and CUSUM of Squares plot for Economic growth and Undervaluation

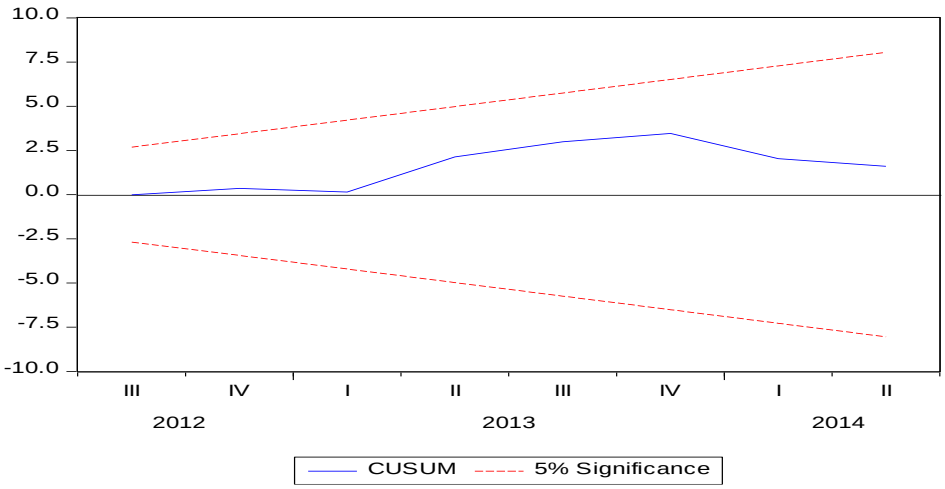
The growth-overvaluation regression presented in equation 4.11, shows that the error-correction term is correctly signed and significant. This shows that, in the short run, deviation from this relationship could occur due to shock to any of the variables as a result of the differences in the dynamics governing short run real exchange rate and long run real exchange rate. The magnitude of the error correction term is (-1.17) which implies that instead of monotonically converging to the equilibrium path directly, the error correction process fluctuates around the long-run value in a dampening manner. However, once this process is complete, convergence to the equilibrium path is rapid.

The result also shows that there is a negative and significant relationship between growth and RER misalignment. This result implies that growth would decline in response to increases in the RER misalignment (overvaluation). In other words, an increase in real exchange rate overvaluation (say, 1%) would imply a growth decline of approximately 29 percentage points. This result is consistent with those of Rodrik (2008), Berg and Miao (2010), Aguirre and Calderon (2005), Gala and Lucinda (2006) and Eichengreen (2008) in the sense that an undervalued REER is beneficial for long-run growth, while the opposite is true for an overvalued REER. The exchange rate misalignment (overvaluation)-growth nexus is possible through its effect on precipitating inflationary pressures which has long term effect on competitiveness and growth (Jongwanich, 2009; Fic, Barrel and Holland, 2008) among others showed that exchange rate overvaluation decrease the ratio of manufactured exports to GDP; which can reduce exports and consequently, leads to reduction in growth rate.

The short run result also indicates that an increase in government spending in Nigeria as well as investment in human capital development are positive and significant, this is in favor of the argument that public investment in roads, electricity, transportation, telecommunications, education and health, generates externalities that enhance private factors productivity and can thus support economic growth (Aschauer, 1989, Tanzi and Zee, 1997).

$$\Delta(GR)_t = \underset{0.00}{-0.23}\Delta(GR)_{t-3} + \underset{0.00}{0.58}\Delta(GR)_{t-4} + \underset{0.00}{7.73}\Delta(INV)_{t-4} - \underset{0.02}{0.29}\Delta(MISALSVAR * OV)_{t-2} + \underset{0.00}{6.74}\Delta(OPP)_{t-1} + \underset{0.32}{1.82}\Delta(TOT)_{t-4} + \underset{0.00}{9.37}\Delta(GCON)_{t-4} - \underset{0.00}{1.17}\Delta(ECM)_{t-1} - \underset{0.09}{0.87}(OV) + \underset{0.26}{0.64}D2007 + \underset{0.56}{0.73}D2009 - \underset{0.00}{26.10}C \quad \textbf{4.11}$$

$R^2 = 0.88$, Adj. $R^2 = 0.87$, RESET=0.19(0.84) LM=1.22(0.30) ARCH=0.77(0.38) , DW=2.01



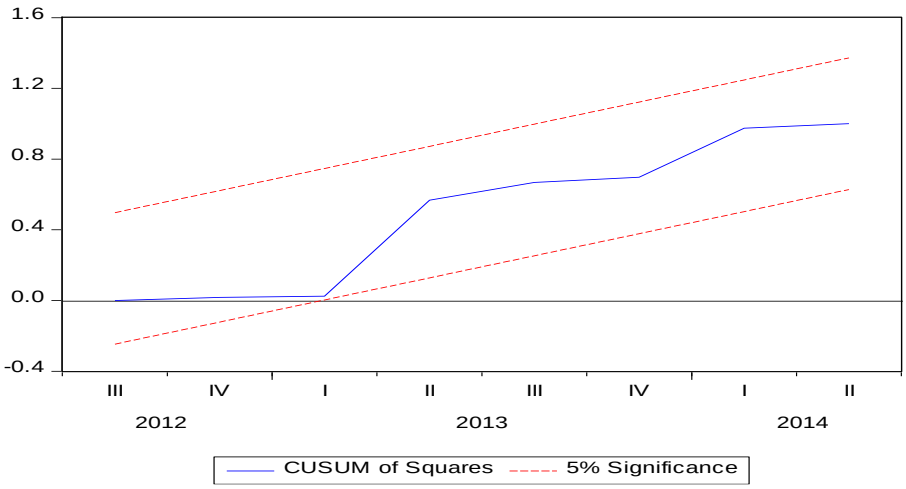


Figure 20: CUSUM and CUSUM of Squares plot for Economic growth and Overvaluation

The trade openness coefficient is positive and statistically significant. Thus, the more countries are outward-oriented, the more this contributes favorably to economic growth. These results are in line with those found by Cavallo et al. (1990), Calderon et al. (2004) and Dufrénot et al. (2009), and, more generally with the neoclassical approach according to which the positive impact of trade on growth is explained by comparative advantages. The evaluation statistics as indicated underneath equation 4.11, shows that the model is a best fit and does not suffer from autocorrelation, heteroschedasticity etc. The stability property of the short run dynamic model as

presented in the CUSUM and CUSUM of Squares plot in Figure 20 shows that it lies within the ± 2 standard error bounds in all the periods, indicating that our parameter estimates are stable.

4.4 Exchange Rate Misalignment and Current Account Imbalance

The result of the Bound test for cointegration shows that the variable in the model are cointegrated. In other words there is long run relationship among the variables as indicated in table 4.21, which validates the use of fully modified OLS.

Table 4.21 Result of Bound Test of Cointegration

Test Statistic	***Value***	***K***
F-statistic	5.8861	7
Critical Value Bounds		
Significance	***I0 Bound***	***I1Bound***
10%	1.92	2.89
5%	2.17	3.21
2.5%	2.43	3.51
1%	2.73	3.9

Source: Eviews 9 Output

4.4.1 Fully Modified Ordinary Least Square Result (FMOLS) Estimation Results

The FMOLS result presented in Table 6.2 indicate that the respective coefficients carry their expected signs are statistically significant, the coefficient of the oil balance (OILB) is correctly signed and significant, reflecting an improvement in current account balance as a result of positive oil price shock. The openness variable, although insignificant has negative sign which is in line with its aprio ri sign implying a systematic worsening effect on the current account. This reflects the fact that liberalization of trade has led to the import of high quality product into the country, resulting in a worsening current account. The youth dependency ratio is positive and significant implying that higher number of youthful population leads to improvement of current account, this result is in line with Higgins (1998) who showed that countries with large fraction of dependent population tend to have a high investment demand. Monetary policy variable which is represented

by M2GDP is negative which implies that increase in money supply relative to GDP leads to excess demand pressure which manifest itself in a worsening of current account and a rise in domestic inflation. The estimated coefficient of relative productivity proxy (*RGDP*) is positive although insignificant implying that when the relative productivity of labour increases, the current account improves. The sign of NFA as a ratio of GDP is positive and significant which confirm to the theoretical explanation of the link between the government balance and current account, although with reserve depending on the degree to which consumers react in accordance with or against the Ricardian equivalence, suggests positive relationship between both variables. This is based on the hypothesis that an increase/decrease in the government balance would make available more/less national savings, with the consequent improvement/deterioration of the current account. However, Chinn and Prasad (2003) observe that, especially for the industrialized countries, a significantly large initial stock of NFA is associated with large current account surpluses.

Table 4.22 Estimated Equation of CAGDP and its Determinants

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
OILB	23.3241	7.2035	3.2379	0.0015
RGDP	17.2181	11.9782	1.4374	0.1531
DEPY	240.6774	114.1171	2.1090	0.0369
OPP	-6.3667	6.6112	-0.9630	0.3374
GCONS	5.8105	5.8303	0.9966	0.3209
M2GDP	-34.2855	10.1966	-3.3625	0.0010
NFA	22.9301	4.4120	5.1972	0.0000
C	44.3606	26.2459	1.6902	0.0935
R-squared	0.7333	*Mean dependent var.*		4.9690
Adj. R-squared	0.7183	*S.D. dependent var.*		9.1265
S.E of regression	4.8437	*Sum squared resid.*		2932.681
Durbin-Watson	2.1719	*Long-run variance*		58.8448

4.4.2 Causality Test between Current Account Imbalance and Exchange Rate Misalignment

Following the confirmation that misalignment series is stationary at levels, while the result for current account imbalance is inconclusive. This study applies the short run causality (were the null

is that of no causality) from the result presented in Table 4.23 the null hypothesis that exchange rate misalignment does not Granger-cause current account imbalance is rejected at 5 percent, in other words, there is causality running from exchange rate misalignment to current account imbalance. However, the null hypothesis that current account imbalance cannot Granger-cause exchange rate misalignment cannot be rejected. In other words, there is evidence of short run unidirectional causality but not bidirectional causality between current account imbalance and exchange rate misalignment.

Table 4.23 Short Run Causality Test

Null Hypotheses	*Obs*	*F-Statistics*	*Prob.*
MISAL does not Granger-Cause CA	*131*	*3.0433*	*0.0287*
CA does not Granger-Cause MISAL		*1.3869*	*0.1065*

4.5 Stationary Vector Auto-Regression VAR

The levels of integration of our core variables (misalignment series and growth rate of GDP) are stationary at levels which make it difficult to conduct reliable co-integration analysis. Moreover, Johansen (1995) multivariate cointegration tests must depart from a congruent VAR model in levels, which is then reparameterised as a Vector Error-Correction (VEC) Model (Patterson, 2000, p. 615). Due to the different levels of integration of our variables, the plausible course of action is to differentiate the variables which are *I(1),* proceed to estimate a stationary VAR model and restrict the analysis to the short-term horizon (Villareal and Ahumada, 2015). To arrive at a statistically appropriate specification, we estimate the lag structure using the lag length criteria, as pointed out by (Patterson, 2000, p. 607) there may be a trade-off between the number of lags and the number of variables included in a VAR system. Subsequently, the VAR model can be presented as

$$Y_t = \alpha_1 Y_{t-1} + \alpha_2 Y_{t-2} + \alpha_3 Y_{t-3} + \alpha_4 Y_{t-4} + \alpha_5 Y_{t-5} + \varphi X_t + \delta_t \qquad 4.12$$

where $Y_t = [\Delta nx_t, \Delta misalsvar_t, \Delta ca_t, \Delta gr_t]$ and represent a vector of endogenous variable, X_t is a vector of exogenous regressors which include a constant term and a special effect dummy representing regime change of the 0,1 form where 0 represents periods of fixed exchange regime and the value 1 for flexible exchange rate. The dummy variables are introduced to capture outliers in the data and thus improve residual behavior. δ_t is a 4x1 vector of innovations, which are assumed to follow a white noise process. Such an assumption has the following constituent attributes: all the elements of δ_t have zero-expected values and are homoscedastic, serially uncorrelated and normally distributed. Furthermore, α_i (with i =1, 2, 3, 4, 5) are the 4x4 coefficient matrices while φ is a 4x2 coefficient matrix. As explained below, the model includes five lags for each variable in each equation based on result from the lag length criteria[11]. It is also important to consider that E($\delta_t \delta_t$) =λ, where λ is the covariance matrix of innovations of equation 4.12. In principle, λ is a non-diagonal matrix, as such VAR residuals are contemporaneously correlated which makes linking of shocks to specific variables impossible. This constitutes the major drawback of the traditional orthogonalization methodology proposed by Sims (1980), as the empirical results are sensitive to the order of the VAR equations. To eliminate the contemporaneous correlation among the constituent element of the innovation vector δ_t, is to adopt the methodology developed by Pesaran and Shin (1998). The building block of the methodology is that it allows for the construction of an orthogonal set of innovations whose effects on the other variables of the system do not rely on the VAR ordering (Villareal and Ahumada, 2015).

[11] Implementing VAR requires the selection of lag length using the standard procedure, a sufficiently large lag length makes the model's residuals serially uncorrelated (Ibrahim, 2001)

We estimate a stationary VAR and compute variance decomposition and impulse response functions as obtained from the VAR result. We set the lag length for the VAR to be 7. The approach utilized in this study is the Pesaran and Shin (1998) methodology which is well suited for this study compared to the Cholesky decomposition that relies on a particular causal ordering of our variables. In addition, we also check the residual correlation matrix of our system for each sample. This is important since the results are only marginally or not sensitive to the ordering if contemporaneous correlations are low among the innovations of the system. We find this to be the case for our four variables stationary VAR framework. For instance, majority of correlations is below 0.05 in absolute value. The highest contemporaneous correlation is between nx_t and gr_t innovations, which is 0.39. Hence, given the relatively small contemporaneous correlations among variable innovations, the results we obtain do not suffer from the problem related to correlated residuals as evident from Table 4.24.

Table 4.24 Residual Correlation Matrix

	MISALSVAR	CA	NX	GR
MISALSVAR	1.000000	-0.054705	-0.053521	0.032961
CA	-0.054705	1.000000	-0.000524	-0.024636
NX	-0.053521	-0.000524	1.000000	-0.390121
GR	0.032961	-0.024636	-0.390121	1.000000

Furthermore, in order to show that our VAR model yields errors which are generally consistent with a multivariate normal white noise process, a multivariate serial correlation Lagrange Multiplier (LM) tests is computed as present in Table 4.25

Table 4.25. Serial Correlation LM Test of the VAR Residual

VAR Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 04/27/17 Time: 02:18
Sample: 1981Q4 2014Q2
Included observations: 124

Lags	LM-Stat	Prob
1	23.30198	0.1059
2	17.96009	0.3262
3	26.87831	0.1429
4	19.83487	0.2278
5	26.73215	0.1076
6	25.11781	0.1678
7	15.68687	0.4750
8	42.17578	0.1104
9	8.663087	0.9266
10	10.14330	0.8590

Probs from chi-square with 16 df.

The Lagrange Multiplier (LM) test as depicted in Table 4.25indicates the LM statistics and their corresponding p-values indicates the absence of serial correlation up to lag order 10. In other words, we cannot reject the null hypothesis of no serial correlation up to lag order thirteen, at the 5 and 10 percent significance levels

Table 4.26 Inverse Root of the Autoregressive Characteristic Polynomial

Roots of Characteristic Polynomial
Endogenous variables: MISALSVAR CA NX GR
Exogenous variables:
Lag specification: 1 7
Date: 04/26/17 Time: 17:29

Root	Modulus
0.981107	0.981107
-0.672491 - 0.664301i	0.945272
-0.672491 + 0.664301i	0.945272
-0.936475	0.936475
0.660717 - 0.619050i	0.905411
0.660717 + 0.619050i	0.905411
0.845619 - 0.233118i	0.877164
0.845619 + 0.233118i	0.877164
0.032001 + 0.873296i	0.873882
0.032001 - 0.873296i	0.873882
0.745821 - 0.419317i	0.855614

0.745821 + 0.419317i	0.855614
0.834306 + 0.047575i	0.835661
0.834306 - 0.047575i	0.835661
-0.400106 + 0.706469i	0.811901
-0.400106 - 0.706469i	0.811901
-0.705174 - 0.376371i	0.799328
-0.705174 + 0.376371i	0.799328
-0.580436 - 0.538569i	0.791809
-0.580436 + 0.538569i	0.791809
0.495063 + 0.613055i	0.787988
0.495063 - 0.613055i	0.787988
0.308984 - 0.708010i	0.772495
0.308984 + 0.708010i	0.772495
0.648153	0.648153
-0.367100 - 0.522949i	0.638935
-0.367100 + 0.522949i	0.638935
-0.207824	0.207824

No root lies outside the unit circle.
VAR satisfies the stability condition.

The result from Table 4.26 shows that the VAR model is stable over time given that all the inverse roots of the autoregressive characteristics polynomial lie within the unit circle (every root has modulus less than one).

Table 4.27. White Heteroskedasticity Test for VAR Residual

Chi-Squared statistics	Degrees of freedom	Probability values
534.1049	560	0.7782

Finally, the White heteroscedasticity test as presented in Table 4.27 indicates that the VAR residual are homoscedastic. Accordingly, the null hypothesis of homoscedasticity cannot be rejected at 10 per cent level of significance.

4.5.1 Granger - Causality Test

The VAR-based Granger-causality tests carried presented in Table 6.9 whose null hypothesis is that the coefficients of the lags of a particular variable are zero in a particular equation. The results inside the parenthesis are significance levels (probability level). From the result, a significance level equal or smaller than 0.10 would allow one to reject the null hypothesis with a confidence level of at least 90%, which essentially means that the lags of the independent variable at issue are

important in predicting the behavior of the dependent variable. In such a case, the implication is that the independent variable is a good predictor of the dependent variable. From the result, it is evident that exchange rate misalignment is an important predictor of current account imbalance, non-oil export and economic growth. The result also shows that there is feedback from economic growth to current account imbalance as well as from current account imbalance to growth. This finding is in line with the view that exchange rate misalignment leads to overheating of macroeconomic variables like growth rate of gdp, current account as well as export.

Table 4.28 VAR-Based Granger-Causality Test

Dependent Variable	Independent Variables			
	$misalsvar_{t-i}$	ca_{t-i}	nx_{t-i}	gr_{t-i}
$misalsvar_t$	NA	12.721 (0.210)	7.641 (0.036)	1.292 (0.088)
ca_t	18.730 (0.009)	NA	5.508 (0.598)	12.006 (0.100)
nx_t	6.691 (0.002)	8.512 (0.290)	NA	31.936 (0.000)
gr_t	3.488 (0.103)	1.543 (0.081)	19.897 (0.006)	NA

Granger-Causality test are based on χ^2-statistics with 5 degree of freedom, given that the VAR model includes seven lags. The numbers in parenthesis are significance levels while NA means not available in the standard testing procedure

The result in Table 4.28 shows the Granger-Causality result, the null hypothesis is that the coefficients of the lags of a given independent variable are zero in a particular equation. Evidence from the result shows that with the exception of current account imbalance, growth rate of GDP (gr_{t-i}) and non-oil export (nx_{t-i}) all have predictive power over misalignment. At the same time misalignment do have predictive power overcurrent account imbalance, growth rate of GDP and non-oil export. This finding is consistent with the view that exchange rate misalignment does have disruptive effect on these variables. The result also shows that there is a feedback from growth to current account imbalance, from growth to non-oil export as well as from non-oil export to growth.

In other words, exchange rate misalignment will impact negatively on non-oil export, thereby causing imbalance on current account which finally impact negatively on growth.

4.5.2 Accumulated Impulse Response Function and Variance Decomposition

Using the accumulated to Cholesky one standard deviation, we uncover plausible impulse responses of all endogenous variables to an unexpected shock with 95% confidence. Each shock or innovation must be thought of as a one standard deviation increase in the variable. Shocks are transitory as the last for only one period (i.e one quarter), also, the 95% confidence interval is used to determine whether, and if so, to what extent IRF is statistically significant. In other words, an IRF is statistically significant at the 5% level if and when its confidence interval leaves out the value zero. However, it is worth nothing that the responses to shocks are not as glaring as they would be if the VAR is estimated in levels compared to the stationary VAR. Although, most IRF as indicated in Figure 21 achieve statistical significance at some point, the result shows that an unexpected and temporary shock in exchange rate misalignment create immediate responses in all the variables. For instance, in the short run, exchange rate misalignment affect the growth rate of GDP. For instance, it improves it up till the second quarter and it's deteriorated in 3rd quarter and improves subsequently. This is in line with the disequilibrium view that misalignment (undervaluation) is good for growth. The accumulated response of non-oil export and current account imbalance showed a similar pattern, the asymptote to zero up till the 3rd quarter and later deteriorates. The significant and long standing response of non-oil export to the misalignment shock confirms the result obtained from the Granger causality test that exchange rate misalignment Granger causes the non-oil export.

The variance decompositions from the Cholescky decomposition following the order shown in the first row of the tables, based on 100 Monte Carlo replication. As shown in **Table 4.29**, the standard

errors indicate that exchange rate misalignment is largely and statistically influenced by its own fluctuations, though its influence seems to be tailing off over the time period; the contribution of other variables are significant but only plays a numerically small role in the fluctuations of misalignment. The FEVD for GDP growth rate shows that it is influenced by its own perturbation 99.59 percent, misalignment accounted for 0.41 percent while non-oil export and current account imbalance do not contribute to variation in growth. By the 20th period horizon, the influence of GDP growth rate to its own shock has dissipated to 88.55 percent, while the contribution of exchange rate misalignment and non-oil export peaked at 2.39 and 7.26 percent respectively. By the 35th quarter horizon, the contribution to own shock decline to 86.60 percent while that of exchange rate misalignment and non-oil export decline to 2.37 and 7.20 percent respectively. However, the contribution of current account imbalance to GDP growth rate rose marginally from 1.80 percent in the 20th quarter to 1.83 in the 35th quarter horizon.

The FEVD for non-oil export shows that it is influenced by its own shock 80.93 percent, growth rate of GDP contributed 18.96, exchange rate misalignment contributed 0.11 percent, while current account imbalance do not contribute to variation in non-oil export in the first quarter. In the 20th horizon, the contribution of exchange rate misalignment to variation in non-oil export increased to 15.15, current account imbalance increased to 18.71 percent, while the contribution of own shock and growth rate of GDP declined to 57.30 and 8.83 percent respectively. At the 35th quarter horizon, the contribution of exchange rate misalignment to variation in non-oil export increased to 18.28 percent, the contribution of current account imbalance also increased marginally to 19.90 percent. However, the contribution to own shock, growth rate of GDP declined to 53.09 and 8.73 percent respectively.

Finally, the FEVD of current account imbalance shows that it is influenced by its own perturbation 99.62 percent, while exchange rate misalignment, growth rate of GDP and non-oil export contributed 0.26, 0.07 and 0.03 respectively in the first quarter. In the 20th quarter horizon, the contribution of exchange rate misalignment, growth rate of GDP and non-oil export to variation in current account imbalance increased to 23.61, 4.07 and 2.88 percent respectively, while contribution to own shock to own shock declined to 69.43 percent. In the 35th quarter horizon, the contribution of exchange rate misalignment increased to 23.75 percent while the contribution to own shock decreased to 69.11 percent.

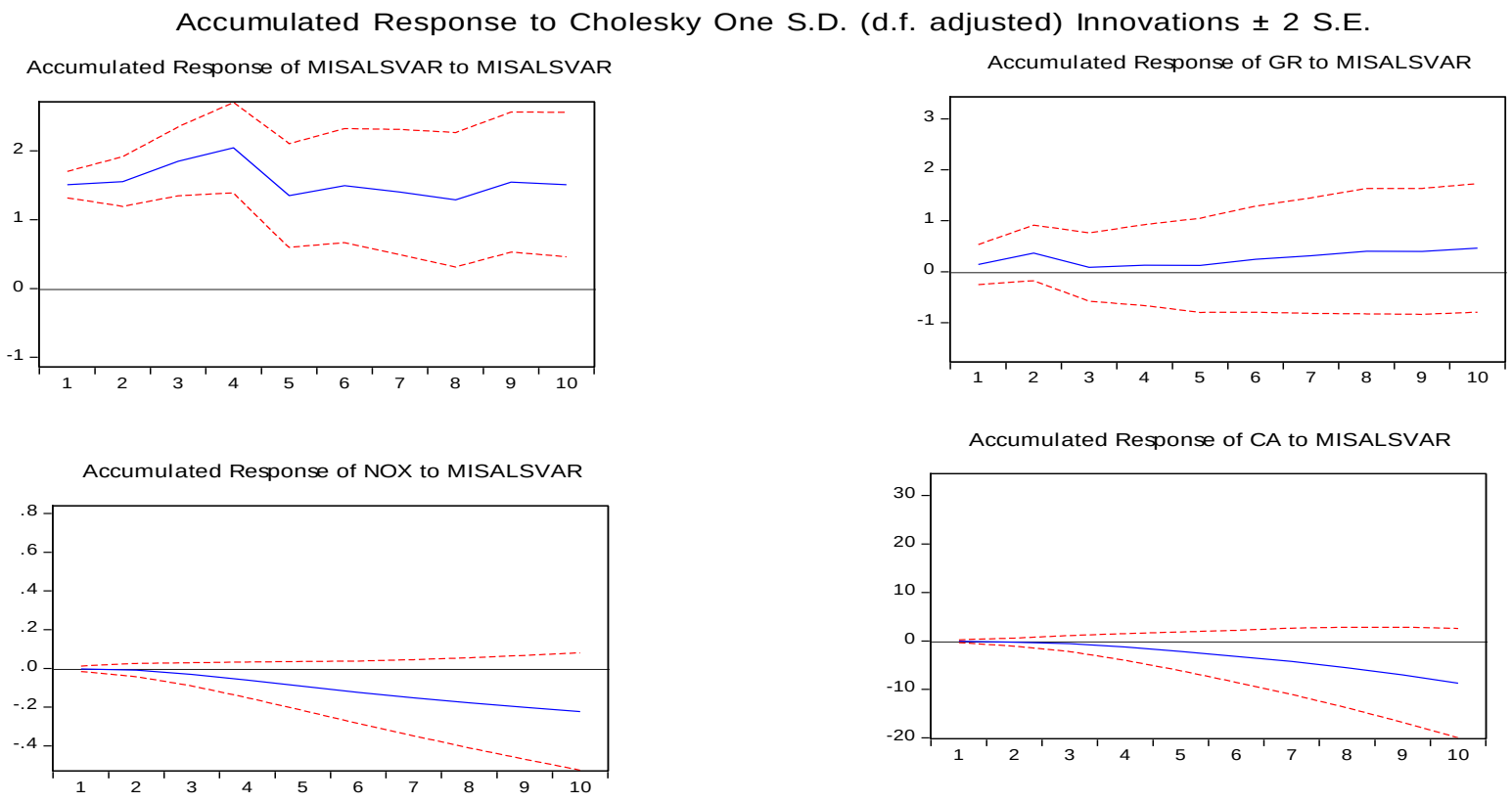


Figure 21: Impulse Response Function.

Table 4.29. Forcast Error Variance Decompositions

	Variance Decomposition of MISALSVAR				Variance Decomposition of GR				Variance Decomposition of Non-Oil Export				Variance Decomposition for Current Account Imbalance			
$Qtrs$	$\emptyset_t$	δ_t	ϑ_t	ρ_t	$\emptyset_t$	δ_t	ϑ_t	ρ_t	$\emptyset_t$	δ_t	ϑ_t	ρ_t	$\emptyset_t$	δ_t	ϑ_t	ρ_t
1	100	0.00	0.00	0.00	0.41	99.59	0.00	0.00	0.11	18.96	80.93	0.00	0.26	0.07	0.03	99.62
5	91.90	3.47	0.86	3.76	2.27	89.16	7.85	0.72	6.02	10.47	83.06	0.44	3.02	0.74	2.69	93.55
10	83.42	5.77	4.28	6.54	2.35	88.91	7.00	1.74	11.38	11.27	75.52	1.82	13.05	0.78	2.10	84.07
15	77.89	6.15	8.46	7.50	2.33	88.49	7.42	1.76	13.16	9.96	64.73	12.15	22.48	2.71	2.52	72.30
20	76.87	6.19	8.94	8.01	2.39	88.55	7.26	1.80	15.15	8.83	57.30	18.71	23.61	4.07	2.88	69.43
25	76.32	6.12	9.20	8.36	2.37	88.59	7.23	1.81	17.43	8.59	54.02	19.96	23.76	4.06	2.95	69.22
30	76.00	6.09	9.40	8.51	2.37	88.58	7.22	1.82	18.16	8.71	53.22	19.91	23.76	4.05	3.05	69.14
35	75.81	6.07	9.54	8.58	2.37	88.60	7.20	1.83	18.28	8.73	53.09	19.90	23.75	4.05	3.09	69.11

Notes: The variables are exchange rate misalignment, growth rate of GDP, Non-oil export and current account imbalance. These are represented by $\emptyset_t$, δ_t, ϑ_t and ρ_t respectively.

CHAPTER FIVE

SUMMARY CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

This study sets out to identify the extent of exchange rate misalignment in Nigeria by estimating four theoretical models of exchange rate misalignment. The models estimated include; behavioural equilibrium exchange rate (*BEER*), fundamental equilibrium exchange rate (*FEER*), natural equilibrium exchange rate (*NATREX*) and structural vector auto-regression (*SVAR*) approach. The study sought to address three objectives: to establish if the real exchange rate is in its equilibrium path or is misaligned; to access the impact of exchange rate misalignment on non-oil exports, economic growth and current account; and to draw policy inference from the result.

Evidence from the findings shows that the real exchange rate is misaligned from the four models estimated. In order to achieve other objectives, we utilized model selection criteria. The criteria adopted for this study is the root mean square error (RMSE) and the mean absolute error (MAE). From the result, the SVAR model has the least RMSE and MAE. The major findings of the study include the following;

There is negative relationship between REER misalignment and non-oil export which implies that real overvaluation far outweighs the effect (or episodes) of undervaluation, thereby, adversely affecting the country's non-oil export performance via loss in competitiveness. Also, in both specifications (undervaluation/overvaluation), the result supports the view of the disequilibrium approach by the positive and significant value of the misalignment) undervaluation coefficient (*MISAL*) (Sekkat, 2015). The proxy for 'Dutch Disease' Oil to GDP ratio indicates that it negatively affect non-oil export performance. The result also indicated that in the short run, flexible

exchange rate regime is associated with more volatile misalignment than the fixed exchange rate regime which negatively affects non-oil export.

On the growth regression, the result indicated that exchange rate misalignment negatively affects growth. Also, by compartmentalizing the result into separate effect of overvaluation/undervaluation, the result for the growth-undervaluation nexus showed that undervaluation positively affect growth, in other words, real exchange rate undervaluation leads to improvement in economic growth outcome, this result is in line with Rodrick (2008). The result also shows that there is a negative and significant relationship between growth and RER misalignment (overvaluation).

The result for the probable effect of policy shift indicates that flexible exchange rate regime is associated with more volatile misalignment than the fixed exchange rate regime. This is due to the fact that the switch to a more flexible exchange rate precipitated inflationary pressures due to supply bottle neck that characterized the periods post deregulation of the foreign exchange market. Although, it takes longer time for the system to revert back to equilibrium under a flexible exchange rate than under a fixed exchange rate, for instance, it takes 12 quarters for disequilibrium to be restored under fixed exchange rate regime compared to 10 quarters under flexible exchange rate.

The result also shows that there is causality running from exchange rate misalignment to current account imbalance. However, the null hypothesis that current account imbalance doesn't Granger-cause exchange rate misalignment cannot be rejected. In other words, there is evidence of short run unidirectional causality but not bi-directional causality between current account imbalance and exchange rate misalignment.

5.2 Conclusion

Within the context of the stated research questions and objectives, the study has revealed that exchange rate misalignment exist, and in terms of the extent and degree it varies across the framework estimated for this study (BEER, FEER, NATREX and SVAR). One common feature of equilibrium exchange rate and their misalignment is that in terms of persistency, the episodes of misalignment lasted for few quarters and in terms of intensity the degree of exchange rate misalignment is not as severe as the results obtained from some other studies. Based on model selection criteria adopted for this study, the SVAR model was used to investigate the effect of exchange rate misalignment on non-oil exports, economic growth and current account imbalance. The result obtained for growth regression showed that exchange rate misalignment negatively affect growth, this implies that exchange rate overvaluation has more effect on growth than overvaluation. This evidence is further supported by undervaluation/overvaluation – growth nexus, were the result obtained showed that overvaluation hurts growth while undervaluation affect growth positively. The negative relationship between RER misalignment and non-oil export volume found in this study implies that RER misalignment could adversely affect non-oil export performance. The result obtained by using episodic approach to the data showed that overvaluation hurts the non-oil export growth while undervaluation has the tendency to increase the non-oil export. With regard to misalignment-current account nexus our result shows that exchange rate misalignment does have effect on the current account imbalance in the short run.

5.3 Policy Recommendation

The crucial policy recommendation that stems from the findings that flexible exchange rate regime is more prone to exchange rate misalignment than the fixed exchange rate regime indicates that it may be a powerful tool to prevent or combat large degrees of under or overvaluation. The floating

exchange rate performed rather poorly due to exchange rate behaving as an asset prices, speculative bubbles or contagion.

The findings that misalignment affect growth and non-oil export negatively and that undervaluation policy can influence both positively, implies that undervaluation policy is important for growth, however it is not sufficient alone to drive growth due to its inflationary effect. Hence, complementary policies like huge investment in infrastructure are necessary in achieving higher non-oil export and economic growth

The result for the determinants of current account to GDP shows that monetary policy variable (*M2GDP*) is more important in correcting current account imbalance compared to fiscal stance. The *M2GDP* is negative and significant which implies that increase in money supply relative to *GDP* leads to excess demand pressure which manifest itself in a worsening of current account and a rise in domestic inflation. As such monetary policy tool can be used to limit the extent of current account imbalance and hence misalignment among other competing policies. In other words, to improve the trade balance/current account position, it is critical that measures should be put in place to significantly increase exports and also reduce the import bill.

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