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GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS**

MASTER'S THESIS

**AN IMPACT OF EXCHANGE RATE VOLATILITY ON NIGERIA'S EXPORT:
USING ARDL APPROACH**

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MARCH 2014

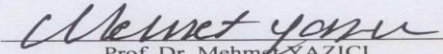
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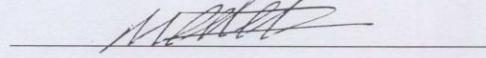

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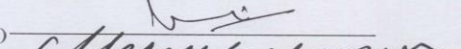
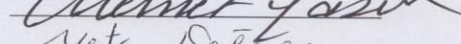
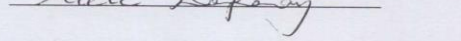
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STATEMENT OF NON PLAGIARISM

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and result that are not originally to this work.

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ABSTRACT

AN IMPACT OF EXCHANGE RATE VOLATILITY ON NIGERIA'S EXPORT : USING ARDL APPROACH

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This thesis seeks to empirically investigate the impact of exchange rate volatility on Nigeria export using ARDL approach. The empirical analysis carried out uses monthly data, covered period from 1999m1 to 2012m12. The result confirms that there is a long relationship between export, real exchange rate, volatility of exchange rate and foreign income. Besides, the volatility of real exchange rate has negative and significant effect on the export in both short and long run; this implies that high fluctuation of exchange rate volatility tends to hinder Nigeria export. However, The real exchange rate result shows positive and significant effect on the export in the long run while in the short run the export is negatively affected by real exchange rate, this implies that depreciation of Naira exchange rate is more effective in the long run to stimulate export activity in Nigeria whereas, in the short run depreciation of the Naira negatively hinders the Nigeria's export. The result of nominal exchange rate shows that in the in the short run volatility of nominal exchange rate has a positive and significant effect on the Nigeria's export, while in the long run foreign income has positive and significant effect on the Nigeria's export.

Key words: Exchange rate volatility, Nigeria's export, ARDL

ÖZET

DÖVİZ KURU OYNAKLIĞININ NİJERYA İHRACATI ÜZERİNDEKİ ETKİSİNİN ARDL YAKLAŞIMI İLE ANALİZİ

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Bu tez, döviz kuru oynaklığının Nijerya ihracatı üzerindeki etkisini, ARDL yaklaşımı ile ampirik olarak araştırmayı amaçlamaktadır. Ampirik analizde 1999m1-2012m12 dönemini kapsayan aylık veriler kullanılmıştır. Elde edilen sonuçlar ihracat, reel döviz kuru, döviz kuru oynaklığı ve yabancı milli geliri arasında uzun dönemli bir ilişki bulunduğunu doğrulamaktadır. Bunun yanında, reel döviz kurundaki oynaklığın hem kısa hem uzun dönemde ihracat üzerinde anlamlı negatif bir etkisinin bulunduğu tespit edilmiştir. Bu sonuç döviz kuru oynaklığındaki yüksek seviyeli dalgalanmaların Nijerya ihracatını olumsuz etkilediğini ortaya koymaktadır. Bununla birlikte, uzun dönemde reel döviz kurunun ihracat üzerinde anlamlı pozitif bir etkisi görünürken, kısa dönemde ihracat, reel döviz kurundan negatif olarak etkilenmektedir. Bu sonuç Naira'nın değer kaybının ihracatı teşvik etmede uzun dönemde daha etkili olduğunu, fakat kısa dönemde Nijerya ihracatını olumsuz etkilediğini ortaya koymaktadır. Bununla birlikte, uzun dönemde reel döviz kurunun ihracat üzerinde anlamlı pozitif bir etkisi görünürken, kısa dönemde ihracat, reel döviz kurundan negatif olarak etkilenmektedir ki, bu sonuç Naira'nın değer kaybının ihracatı teşvik etmede uzun dönemde daha etkili olduğunu, fakat kısa dönemde Nijerya ihracatını olumsuz etkilediğini ortaya koymaktadır. Nominal döviz kuru sonuçları ise, kısa dönemde nominal döviz kuru oynaklığının Nijerya ihracatı üzerinde anlamlı pozitif etkisi olduğunu gösterirken, uzun dönemde yabancı ülke milli gelirlerinin Nijerya ihracatı üzerinde anlamlı pozitif bir etkisinin bulunduğunu göstermektedir.

Anahtar kelimeler: Döviz kuru oynaklığı, Nijerya ihracatı, ARDL

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CHAPTER 1

BACKGROUND OF THE STUDY

1.1 Introduction

The exchange rate is regarded as a value of National currency in terms of a foreign currency. Its fluctuation is one of the key factors affect economic and international trade performance of a country. Therefore, it requires a special consideration especially, in the developing countries that heavily relied on international trade. However, the substantial level of volatility and uncertainty movement of the exchange rate since the commencement of flexible exchange rate, that is the end of Bretton woods system in the early 1970s has generated debate among researchers and policy makers about the magnitude of its impact on foreign trade. The debate has a long time ago divided the economist and Centered on the optimization of alternative exchange rate regimes. As expressed by Cote (1994) that the proponents of a fixed rate regime have argued that since the evolution of the flexible exchange rate exchange rate regime, has been subjected to high fluctuation and the disequilibrium of value have persisted over a long period of time. They viewed exchange rate volatility as a hindrance to domestic export industries from fully engage in international trade. In the other extreme, the proponent of the floating rate regime argued that the exchange rate is mostly influenced by macroeconomics fundamentals and adjustment of such variables would require the same but more abrupt movement in fixed property. Thus, a fixed rate regime will not drain away unanticipated volatility, whereas a greater flexible exchange rate will easily facilitate balance of payment adjustment in response to external shocks without much need for protective measure such as; quotas, tariff or capital control to achieve long run equilibrium.

A floating rate regime always follows by fluctuations in exchange rate, makes it major subject to economic agent such as international trader and policy maker due to its effects on international trade and the economy at large. A country will prefer depreciation of its currency because of its positive effects on exports. However, high volatility of exchange rate causes uncertainty and risk in international trade. Depreciation of exchange rate will increase importation cost, this will lead to an increase in exports and fall in imports. Aziakpo, et al. (2005) argued that in the case of industries in exporting countries, an increase in volatility movement of the exchange rate, if the exporters are sufficiently risk-averse will raise their expectation of marginal utility of export revenue and induce them to export more.

According to Khasa (2012) recent observations indicate that impact of fluctuation in exchange rate on international trade flow is gaining more attention. Particularly African countries, because since the adoption of a floating rate system in 1980s, most of the developing countries have been characterized by high levels of volatility in exchange rate, which affect their trade improvement and capital flows.

Prior to the adoption of a floating rate regime Nigeria exchange rate undergone significant changes. The Nigeria currency was fixed at par with the British pound until 1967 when the British pound was devalued. Owing to the 1967 civil war in Nigeria, the Authority considered it not prudent to devalue Nigeria pound alongside with the British pound rather was pegged to United State dollar. The official introduction of Naira as a Nigeria currency and financial crises of the 1970s, the Nigeria abandoned the dollar peg keep faith once again with the British

¹C.B.N. Journal (2006)

²Joseph et al. (2011)

pound (Dickson, 2012). As a result of slow in the development of an active foreign exchange market, independent management for the exchange rate was established. Hence, Naira was pegged to 12 baskets of the major partners.

The rising of oil price in the world market and export volume of Nigeria in 1970s resulted in revenue from oil to increase. During the period, Nigeria runs persistent increased in external balance and appreciation of the Naira. Between 1973 and 1975, Naira rose more than 100 percent. Consequently, the rise in wages and prices resulted in export to be of comparative disadvantage in the world market. In late 1970s economic malaise begun to develop as term of trade started to deteriorate. By 1981 there was a sharp falling in oil price couple with already manifest economic crises such as excess borrowing and overvaluation of Naira exchange exacerbated the situation. The economic crises reach its peak by 1983 when oil price started to decline drastically. Nigeria export revenue falls significantly. However, the government expenditure did not proportionately fall; as a result large fiscal and external deficit was built-up. As economic crises continuous deepened, the Nigeria government allows the exchange to be determined by market forces. Central bank of Nigeria (CBN) endeavored with several bidding system such as adoption of a strong control mechanism in the exchange rate market in order to ensure stable of Naira exchange rate.

Inability of previous policy to achieve a viable result on the economy led to adoption of structural adjustment program (SAP) in 1986, which was designed to achieve both structural and sectorial policy reform. The reform consists of interest control and devaluation of the exchange rate through flexible rate system. Vigorous implementation of the reform resulted in the growth of many sectors of the economy in the country. For example, agriculture, manufacture and oil sectors accounted for positive growth with average GDP growth of 5 percent annually (Moser et al.; 1997). Onafowa and Owoye (2008) lamented that “SAP evoke strong opposition and sentiment among Nigeria, because of its perceived adverse effect” this was happen almost in all sector of the economy, as a result government abandoned the reform in 1994 and went

back once again to the partial deregulation policy. Which include imposition of interest control, stability of exchange rate and partial control of market for foreign exchange, resulted to prolong stagflation, the policy, before the end of 1995 begins to yield substantial improvement in the whole sectors of the economy; GDP grew up in an average of 3.25 percent annually between 1995 and 2001.

Nigeria is a small open economy, trade with about 100 countries worldwide. Britain was the first major partner to trade with 70 percent of exports from Nigeria and 47 percent of imports from Britain. Later the composition changed, The United State became a major trading partner buying more than 36 percent of its export mainly oil from Nigeria. The imports and exports to Britain dropped to 38 percent and 32 percent respectively. Nigeria has associate status which consists of export preference with some member of European Economic Community (EEC) which comprises of France, Germany, Netherlands and Spain. Also has trade relation with some member countries of the organization of economic co-operation and development that is Canada, United States and Japan.

1.2 Statement of Problem

According to Olimov and Sirajiddinov (2008) most of the literature raised on the study found that the relationship between exchange rate volatility and trade is mixed. Analysis base on the different underlying assumption only holds in certain cases. However, empirical evidence also is more sensitive to the choice of sample, time horizon, form of proxies for exchange rate volatility, country to be considered and model specification. De Vita (2004) argued that lack of a clear pattern of conclusive result in line with inquiries may be the cause for shortcoming in the empirical evidence, such as the used of in- appropriate estimation methods. Early studies employed OLS estimation under erroneous presupposition of stationary of all series and some recent studies uses Johasen cointegration (Johasen, 1988 and 1999) model under a very strict assumption that all variables used in the export equation have unit root, this raise a

problem of mixing I (1) and I (0) regressor, in which statistical inference base on conventional likely hood ration statistic for cointegration is no longer valid. Both present and previous evidence intuitively suggest that the export equation is featured by combining I (1) and I (0) regressor. Hence, foreign income and relative price are expected to be ordered one, whereas, volatility measure is often constructed at level stationary.

Despite large number of studies on the subject, Bakhradow (2011) noted that most of the empirical studies focuses on developed countries with few literatures on developing countries due to lack of historical data and underdeveloped nature of their financial market. Akpan and Atan (2011) explained that exchange rate policies in developing countries are always controversial due to frequent structural adjustment which have an impact on trade in the short run, are perceived as damaging the economy. However, such distortion that mostly originates from overvalued of exchange rate system hardly subject to debate in the developing country which heavily depend on importation for both production and consumption.

Since 1960s Nigeria's exports was mainly primary product which includes a small amount of solid minerals. Nigeria continues to specialize in primary products (raw material such as cash product and organic oil) for exports while imports comprise of secondary products (manufacture equipment, machinery and transportation equipment). The country's economy was largely sustained from revenue earns from export of primary product for development, which constituted about 98 percent of exports. However, 1970 to 1985 during oil boom, minerals (largely oil) increased from 35 percent in 1975 to 96 percent in 1985. Dependence on the revenue from exports of primary product exposes the country's economy to world price fluctuation. Many policies and measures have been put in place by the government to address the issue, yet no positive response from most of the sectors.

1.3 Research Hypotheses

This research focuses is to empirically investigate the impact of exchange rate volatility on exports of Nigeria. Previous studies conducted in Nigeria include Aliyu (2008), Dickson (2011) and Shehu and Youtang (2012) among others, mostly employs Johansen cointegration and Granger casualty test methods to examine the cointegration. In order to provide additional empirical evidence this research employs advance and a recently developed model, that is, autoregressive distributed lag (ARDL) proposed by Pesaran et al. (2001). The following hypotheses are the hypotheses;

H_1 = There is cointegration that exists between the Nigeria's export and exchange rate volatility of Naira.

H_2 = there is cointegration that exists between the Nigeria's export and exchange rate of the Naira.

1.4 Significant of the Study

Exchange rate volatility could have impacts on trade flow and economy of a country. Merely look at the variables without in- depth analyses it will be hardly to foresee the nature of such impact between the variables (Khosa, 2012). Therefore, in-depth analysis is necessary. In the developing countries as early explained researches have been limited or inconclusive, Therefore, this study contribute in filling the existing gap in research and also provides bases for analyses, evidence to policy makers for prudent decision, and as a literature for further research.

1.5 Objectives of the Study

The primary aim of this study is to examine the impact of exchange rate volatility on export of Nigeria. The study also focuses in achieving the following specific objectives.

1. To empirically investigate the impact of exchange rate volatility on Nigeria's exports.
2. Analyze various studies evidence on the topic.
3. Review Nigeria exchange rate policy, economy and trade.
4. Make recommendations on how to improve the Nigeria exchange rate and exports.

CHAPTER 2

THEORETICAL BACKGROUND AND EMPIRICAL STUDY

2.1 Introduction

A substantial increase of volatility and uncertainty in the movement of the exchange rate, since the collapsed of the Bretton wood system in the 1970s to 1980s has led to a huge generation of literature and empirical evidence, concerning the effect of exchange rate variability on trade flow. (Ozturk, 2006) volatility in the exchange rate is considered as risk in international trade, which is relating to the fluctuation of the exchange rate. Macroeconomic fundamentals such as inflation, interest rate, Balance of payment which have become more volatile in 1980s to 1990s are causes of such fluctuation in exchange rate. However, improvement in technology, rising in cross border trading activity that have been facilitated toward liberation of capital accounts, and speculator in the exchange rate market have also contributed to high fluctuation of exchange rate.

Literature on the economic effect of exchange rate movement has focus exclusively on its impact on trade flow. Large number of literature started around 1970s after the ends of the Bretton wood agreement. Despite many years of research on the subject, there is no consensus on the consequence of exchange rate movement on international trade. However, the literature has produced large numbers of models with various predictions on the relationship between the variables. (Claude 2007) some literature presumed that relationship is positive between exchange rate variability and trade flow, while other presumed a negative relationship. In empirical side, the studies have also endeavored to investigate the size of effects of exchange rate fluctuation on

trade. But, neither theory nor empirical have been able to come up with a clear evidence in this regards.

Among early researches that examined the exchange rate volatility and trade relation include the work of Either (1973), Clack (1973), and Hooper and Kholhagen (1973) mentioned but a few. In that early period, variation is been made between the uncertainty in exchange rate and profit uncertainty. Either's model constitutes foreword market hedging and demand for foreword cover which is normally determined by uncertainty on exchange rate, but does not necessarily have effects on the trade. The trade is only affected when the firm presumes inability to determine its gain at various exchange rates. Another model was developed by Hooper and Kholhagen (1978), in their model only part of trade is being hedged in the forewords market so that the only unhedged part of trade is affected by the volatility of exchange rate.

Recent literatures suggest that the negative impact between exchange rate volatility and trade explained by early researchers is based on a various limited assumptions. Resting such assumptions tend to weaken the negative relationship, even turn to positive relationship. That is, the assumption concerning risk averse, expectation of future profit result from change in exchange rate and the extent to which transaction can be hedged in forward market (Duncan Hodge; 2005).

2.2 Exchange Rate Regime

Selection of exchange rate regime has considerable effect on a country's inflation, balance of payment, trade, capital flow, and other macroeconomic fundamentals. Therefore, proper selection is a paramount component for economic stability and growth. However, there is no single agreed procedure or consensus on how to make such choice; also no single regime suitable for all countries. Some specific features of a country such as level of economy and financial development, production and trade, persistent inflation record, type of shock the country received, and policy maker's preference. The credibility of country's institution is strongly required; there is also a

need for supportive policy that is monetary and economic policy, because macroeconomic policy and monetary policy are also strongly required for the competitive exchange rate system to be sustained in any regime. However, in the absence of consistence in the policy and fiscal balance, crises will be inevitable. Most of the economic crises in emerging market economy are being considered as originating from exchange rate regime, financial crises in Mexico (1994) and turkey (2001) among others. Although, is very hard to link exchange rate regime with any specific role that led to the crises. The crises were direct or indirect cause by change of regime, because of huge capital outflow in order to leave fixed exchange rate target in order to shift to floating regime. Some argued that setting explicit peg exchange rate was a mistake while others argued that had been the systems were proper follow none of these crises would have happened (Frankel; 2003).

Peter et al. (2004) argued that fluctuations in exchange rates have increased, during the period of currency and balance of payment crises of 1980s to 1990s. There was no evidence of an increase on average in such volatility in the 1970s. It is important to note that an exchange rate that categorize as pegged does not necessary mean has a lower overall volatility than arrangement that allows some degree of free movement of the exchange rate. Pegging of a country's currency still leaves the country vulnerable to the fluctuations anchor of other currencies; misaligned pegs can subsequently cause exchange rate market pressure and large fluctuation in currency values and lastly volatility.

Milton Friedman (1953) base on his initial article, outlines benefits a country can derive from the floating rate regime, compare to the fixed rate system. Firstly, He mentioned that floating rate regime facilitates country to an independent monetary.

³ For further analyses on the exchange rate regime, see Exchange rate regime in the OIC member countries (2012) OIC outlook, page1

⁴ World Bank report, IMF (2004)

policy system, which in most cases the official rate is zero other things being equal, except for a country facing recession with downward rigid price. The expansionary monetary with the effect of exchange rate devaluation will produce an increase in aggregate demand through exchange rate and interest rate, thereby raising the economy to a stable balance both internal and external. Contrary to fixed rate regime, monetary policy is made to defend peg. Therefore, the economy depends on the automatic mechanism such as wages and flexible price which in most case are having a slow economic effect.

Secondly, suppose benefit from the floating regime is in terms of insulating property in response to real shocks, which normally occurs in the form of trade shocks. For instance, a fall in export demand of a country in the world market may be automatically counter by devaluation of currency, which provides an offsetting stimulus to the export demand.

Thirdly, floating rate – base system provides a stable system in an exchange rate regime, compare to Bretton wood which contains an adjustment mechanism that most of time suffer from speculative attacks and periodic crises. Flexible exchange rate produces expected stability in the system which is considered as a key element for providing tranquility in the exchange rate environment.

Fourthly, in a flexible exchange rate regime central bank maintains its independent function as senior age and lender of last resort. The later meaning that, central bank provides unlimited funds to bail out banks during banks financial crises.

Fifthly, flexible exchange rate regime facilitates the economy of a country to a stable growth. Without any protective instrument of trade barrier or balance of

⁵ Explanations on Milton article and calculation of zero reserve, check Exchange rate theories and evidence by Ronaldo M. (2007) page 30

payment (such as quotas and tariffs) by allowing the exchange rate to have uninterrupted movement to equilibrium.

2.3 Volatility of Exchange Rate and Trade

Mikael (2006) defined Exchange rate as the price of the domestic currency in terms of foreign one. Volatility is regarded as an unobservable or latent variable, deterministic or stochastic. There are some studies that attempt to make it an observable variable with several of results. In a floating exchange rate regime the transaction costs are higher than in a peg regime (Jones and Kenan, 1990). Exchange rate is highly volatile in the short run and highly responsive to political events, monetary policy and changes in expectations. In the long run, exchange rates are determined by the relative prices of goods in different countries (Samuelson and Nordhaus; 2001). The exchange rate is more volatile than the fundamental variables, which determine the exchange rate in the long run Gärtner (1993).

Salvatore (2004) argued that the exchange rate has been highly volatile in recent decade due to the abandonment of peg regime. This is the reason for massive increase in foreign exchange transactions. The transactions have grown faster than international trade and investment flows of capital. The risk associated with foreign exchange transactions and trades in the foreign exchange market has substantially increased, so also the awareness and knowledge. There are also better instruments to cover the risk. International private capital flows are much larger than trade flows today, which shows that exchange rates reflect mostly financial rather than trade flows, especially in the short run. Moreover, the trade flow has a high impact on exchange rates in the long run, while the impact on trade is directly relates to several macroeconomics variables, such as demand and supply for goods and services, investments, different growth and inflation rates in different countries.

Broda and Romali (2003) explain that the effect of exchange rate volatility on trade flow is mixed. The idea of Standard theory that fluctuation in exchange rate volatility

may adversely affect trade flow centered on the notion that exchange rates will create uncertainty therefore increases the cost to the risk adverse trader. Hooper and Kohl Hagen (1978) in their theoretical model explain how exchange rate volatility might depress trade flow. In the same vein, Broda and Romali (2003) model also shows the effect of exchange rate on trade flow. Boum and Ozka (2004) discovered that the relationship between international trade and exchange rate variability is nonlinear, depending on the fluctuations of economic activity of importing country which, varies between a set of country.

In addition, Srinivasan and Kalaivani (2012) argued that the idea that volatility will increase cost of risk-averse trader represent uncertainty, because the volatility is always treated as a risk. However, the increase in the volatility of exchange rate imposes cost to risk-averse and hinders trade flow, because the agreement on the exchange rate is reached at the period of the contract while the payment is always made at the delivery period. Hence, when the fluctuations in exchange rate become unpredictable, it creates uncertainty about the potentiality of future profit. Cote (1994) suggests that the assertion of risk-averse would not lead to the conclusion that fluctuations in exchange rate will hamper trade volume. Risk or uncertainty of exchange rate volatility constitutes two effects, namely substitution and income effects which move in an opposite direction. The former means that fluctuations in exchange rate will negatively affect trader's activity which will result in a reduction of total utility of the activity, while the latter produces extra resources from financial market that might be injected into trade activity in order to compensate for the plunge.

Alessandro (2013) added that the assertions that increase in exchange rate fluctuations will negatively affect trade is because the risk and cost of transaction are related to the exchange rate volatility, which cause reduction in incentive to trade. However, literature on the economic effect of the relationship developed in the last decades. Early studies find negative relationship whilst subsequently studies report very small impact, more recent studies (Wei; 2004 and Teneyro; 2006) used refine quantitative method. They discovered that the result of the relationship is more skeptical

about the casualty of the short term exchange rate effect on trade. Reverse of the casualty result could facilitate in driven by any of relationship between exchange rate and trade in which trade causes stability of exchange rate by reducing its fluctuations. Another considerable argument is that risk relates to uncertainty is often softened by increase in different types of financial instruments, such as forward contract and options that allow firms to hedge against uncertainty of exchange rate. However, the other available instrument is sunk cost, that is, the higher the sunk cost (fixed cost) of exports the lesser firm suffers from risk result from fluctuation of exchange rate. These are the reason why the fluctuation is a less critical issue in international trade.

2.4 Trade shock

Trade shock refers to net loss or gains from trade normally cause by changes in the international price of goods or volume of international trade. It is relates to the dynamic changes in the global market, which is above influence of a country. The shock comprises of two effects, namely volume of trade and price effects. The gain from international trade is normally arriving by subtracting export revenue from cost of importation. Any changes that may occur there in, it is cause by either change in volume of trade or price which may result to positive or negative effect as the case may be. These changes are widely known as shock, which could be analyzed by the combination and interaction of the following components;

- (a) Effects result from a change in international prices of exports
- (b) Effects result from changes in international prices of imports
- (c) Effects result from changes in the volume of export demand from the world market
- (d) Effects result from changes in the volume of imports demanded by the world market

The net sum of component (a) and (b) will be referred to as term of trade-shock, which may be in the form of either positive or negative. For instance, a rise in export price that follows by a fall in the price of import all things being equal, the country will unambiguously experience positive term of trade-shock. Falling in the export prices followed by rising in the price of imports all things being equal, the country will unambiguously experience negative term of trade-shock. The other remaining combination of price changes in the term of trade-shock sign will depend on the degree of importance of such changes in the world market price and relative importance of the product in the country's trade balance. Other components (c) and (d) are not summed up into a single component due to their different impact in the trade. For example, a change in the export demand from the world market is termed as external shock components. It is exogenously out of a country influence, whereas, changes in import demand is endogenously influenced by a country and depends on the income and behavior of domestic economic agents, which can be easily influenced by government policy. Therefore, changes in export demand component is termed as the true external shock which could also refer as trade shock.

Most of developing countries suffered from high fluctuation in the price of their exports, which contribute to a substantial increase in the volatility of their output growth. Changes that normally occur in the term of trade that is changes in exports price relative to the imports price, contribute to more than half of output fluctuation in the developing countries. (Baxter and Kouparitas, 2000) explain that the volatility of term of trade is larger in developing countries than it is in the developed country, because of heavy dependence of developing countries on exports of primary products whose prices are highly fluctuate than that of manufacture products. Developing countries also are exposed to a high degree of openness to foreign trade therefore, sharp fluctuation in the term of trade affect more than half portion of the developing countries economy.

The developing countries are more vulnerable to fluctuation of term of trade due to small, if any, leverage on the price of their export commodities while developed countries and some of oil export countries influences the prices of their export products.

Considering the fact that shocks from term of trade shift in developing countries are largely exogenous courses by world markets, account for roughly half of output fluctuation in those countries Mendoza (1995) and Kose (2000).

Economic theory suggests that the strength that a country will be able to cope with the shock from a term of trade basically relied on the type of exchange rate regime operate in that country. In a fixed regime, the domestic currency is pegged to a foreign currency or a basket of foreign currency, in a floating rate regime the currency is allowed to have free movement and determine through the forces of demand and supply in the world market. Thus, countries operate floating rate system will easily be able to adjust from shocks of term of trade.

In order to comprehend the logic of the theory, consider the effects of falling in the exports in both fixed rate and floating rate regime. At the beginning, it will negatively affect trade by causing a fall in the income of country's exporter and economic activity such as employment in the export industry. Since, exporters received less foreign currency say dollar, (Naira and dollar will be used as currency under consideration) less dollars will be supply in the exchange rate market thus, foreign currency will become scarce. The market participant will cease the opportunity to sale more foreign currency for domestic currency. This will make the domestic currency to become weak.

If the country operates under the fixed exchange rate regime, the authority will attempt to intervene in order to restore back both currencies value inline. The authority will sustain Naira value by purchasing Naira for dollar. Their action will drain out Naira from the money market so also the amount of credit available for business expansion and investment. Because the effect of authority action is equivalent to a contractionary monetary policy in response to fall in the export price, this will cause increase in the cost of production and few outputs to be produced.

However, in the case of a country that operates under a flexible exchange rate regime, the authority will not intervene in the foreign exchange rate market. They will allow the value of domestic currency to depreciate. The depreciation of the domestic currency will make exports more competitive in the world market. This will stimulate

export industries to increase output and clear the negative effect of term of trade shocks. Peg regime will adjust for term of trade shocks through contract of the output whilst floating rate will allow the domestic currency of a country to depreciate freely (Timothy; 2003).

Moreover, shocks from a term of trade affect economic activity and income of both private and public sectors. In most cases the shock indirectly reverberates throughout the economy and affects macroeconomic balance, output, debt and trade. The way and nature of the effect depends on the size and duration of the shock and structure put in place in the economy, such as degree of diversification and measure taken to absorb any impact from the shock which include government policy and the amount of foreign assistance.

Country's exposure to external economic shocks generally depends on its reliance on exports, because export earnings finance imports and also contribute directly to investment and growth. Production structures primarily oriented towards export-led growth expose countries to external shocks more than production structures reliant on domestic demand (Foxley 2009). It is important to note that, although the impact of an economic shock is typically registered through losses in export earnings, the size of impact (the magnitude of trade loss) depends on each country's mix of exports and trading partners, that is on its degree of export concentration.

International policy measures focus on building resilience to economic shocks; have pointed out the need to recalibrate an export-led growth strategy by strengthening

⁶ Beatrice, k. M. (2001)

⁷ Christian, B. and Godwin, A. (2010)

⁸ Moses, H. L. (2013)

⁹ Alex, I. and Rob Vos (n d)

¹⁰ Export dependence and export concentration, MDG's progress in age of economic uncertainty

domestic demand and pursuing a trade agenda that focused on export diversification. However, these efforts need to be complemented by regional cooperation efforts that strengthen export diversification and international trade environment, focused on trade facilitation and market access for the exports of developing countries. Especially, least developed once.

2.5 Theory of exchange rate and international trade

The bases for theoretical foundation that explains the effect of exchange rate volatility on trade flow have root from J-curve effect and Marshall-Lerner condition.

The J-curve theory explains that following devaluation of the domestic currency value of a country, a decrease in the trade balance is then followed by improvement. During such devaluation of currency there is a price effect courses by rising in the price of imported goods, delay in transaction of goods which have been ordered for the past few months prior to increase in the price of imported goods in the short period of time, then later, when traders have the opportunity to modify their inputs strategy in response to an increase in the import price in order to connect their losses in competitive with goods produced abroad. Their action will result to a quantity effect, which is the volume of imported goods will be downward adjusted while domestic production will probably increase to meet up existing demand. The volume of traded goods will continue to slowly adjust than changes in relative price. The expected final effect is long run improvement in the aggregate trade balance. This hypothesis is named as J – curve, because when the net trade profit is plotted on the vertical axis and time period is plotted on the horizontal axis. The response of the trade balance to devaluation is diagrammatically curve like letter J.

The Marshall-Lerner Condition seeks to answer the question why a real devaluation (in fixed exchange rate) or real depreciation (in floating exchange rate) of a domestic currency need no to immediately improve current- account balance. The condition states that the total summation of both imports and exports in their absolute

value must be greater than one for currency depreciation to have positive impacts on balance of payment of a country.

The net effect of export and import – greater export quantity at a lesser price and diminishing quantity of expensive import will depend on the elasticity of both import and export, that is if the imported goods is elastic in price the quantity demanded will increase more than fall in price proportionately, the total revenue will increase. Equally, if imported goods are elastic, total cost of imports will fall (Huchet- Bourdon and Korinek; 2011).

2.6 Overview of Nigeria Economic and Exchange Rate policy

In an attempt to achieve stable economic growth, exchange rate policy in Nigeria has undergone different formation, from fixed rate regime in the 1960s to a pegged arrangement between 1970s and early 1980s, and lastly to different flexible regime in the late 1980s. Major considerable factors that affect the selection of exchange rate regime include macroeconomic fundamentals and external environments which include the effect of different Radom shocks on trade balance. Nigeria is among developing countries in which their economy is characterized by unstable macroeconomic and financial condition that cause the economy to be vulnerable to various shocks to trade balance.

According to Sunusi (2004) in Nigeria the foreign exchange earnings are more than 90 percent dependent on receipt from crude oil exports. The result is the volatility of world oil market to have an impact on the supply of foreign exchange. Nigeria as a monoculture economy exclusively depends on crude oil. When the price of oil is high in the world market the revenue shares by three tiers of government increases correspondingly. It has been the traditionally observed that since 1970s, to draw the facts that, comparable government expenditure increase which has been so difficult to cut down when the oil price fall and revenue earned reduce proportionately. This type of unsustainable government expenditure has been the reason for the high government

expenditure. It was therefore paramount for government to create a reserve when the oil price increases in order to pave the shortfall of government expenditure when the price of oil falls in the world market.

Following the adoption of the structural adjustment program (SAP) in the 1986, the Nigeria exchange rate regime shifted from fixed rate to flexible exchange rate regime. It is obvious that no any flexible exchange rate is pure float, that is the situation is entirely determine by invisible forces of demand and supply, but rather the existence is that the monetary authority from time to time intervene in order to achieve some objectives in restoring the exchange rate (Azeez,2012). So also is the case with Nigeria, despite tremendous efforts by the concerned authorities to maintain a stable exchange rate, the currency Naira has continuously depreciate.

Since the establishment of CBN exchange rate policy has been focused on maintaining the external value of Naira and a healthy account balance position. Rising in foreign exchange rate demand in 1980s, when the supply was shirking stimulated the need to develop a related market for exchange rate with a strong control in order to deal with the persistent crises. In effective control to develop such a strong mechanism that will ensure full allocation of exchange rate led to the establishment of the foreign exchange rate market, which was later liberalized to inter-bank foreign exchange rate market (IFEM) in 1990s (Mojekwu, Okpala and Adeleke; 2011). The IFEM operated as a two- way quote system. The aim was to widen the supply of foreign exchange rate, by funding the inter-bank operation of privately-earned foreign exchange rate in order to facilitate Naira to attain a realistic exchange rate. Despite substantial amount of foreign exchange injected by the CBN into foreign market, there was no reflection on the performance in the real sector of the economy, rather persistent increase in the importation of finished goods. That is, instead, the foreign earnings from crude oil started to improve output and employment growth in countries from which imports of Nigeria originate. There was also an increase in demand pressure in the foreign market and continuous depletion of external reserve.

The central bank (CBN) introduces Dutch Action System (DAS) in place of IFM. The objective was the same that is, the attainment of a realistic exchange rate of Naira that will reduce the excess demand for foreign exchange and fallen of external reserve. It was also designed as a two-way action; both the CBN and authorized dealers will participate in buying and selling of foreign exchange in the market. The CBN was expected to determine the amount of foreign exchange to supply in the market at a price in which the buyers are willing to buy; the marginal rate that is the rate that clears the market is the auction.

DAS has been successful in attainment of most of the monetary authority's objectives, it facilitates the contraction of arbitrage premium from double to single digit, and it has also to some extent restore stability of Naira exchange rate against the dollar. Since the introduction of DAS Naira has been volatile in a single digit range and lastly, it has also reduced expatriation of capital and curbing rent seeking amongst foreign exchange market.

2.7 Empirical analyses

Since the development of a flexible exchange rate system in 1970s, there has been an increase in empirical evidence, especially in the developed country that analyzed the effect of exchange rate volatility on trade flow. Most of these studies however, indicate that the relationship is ambiguous. A study conducted by Pick (1990) and Baum (2010) reveals that the evidence of the relationship is not clear. Marc and Michele (2011) argued that early studies conducted by academics and policy oriented economist on a wide empirical research for the effect of exchange rate volatility on trade flows, leaves no or less ambiguous result. (Taglioni; 2002) it is traditionally assumes that the negative effects of the relationship between exchange rate and trade if exists is certainly small. In another opinion share by Ozturk (2006), constitutes a fairly comprehensive empirical survey dedicated to the relationship between exchange rate and trade flow. He uses different estimation techniques, specification of sampling and data sets result in a large

mix of evidence, some in favor while others against the hypotheses of a negative relationship between exchange rate and trade.

Mikael (2006) examines the influence of exchange rate volatility on exports of Sweden using aggregate data of Sweden and Europe zone between 1993 and 2006. He employs statistical analyses using a regression method. The result reveals no evidence that exchange rate influence Swedish exports. Hooper and Kohl Hagen (1978) investigate the impacts of exchange rate volatility on the volume of trade within developed countries. They found that volatility has no significant impacts on the volume of trade. A study by Ying and Penos (1984) examine the effect of volatility of exchange rate on trade using ARCH model. The result reveals negative impact of exchange rate volatility on the export of Japanese and Canadians to US and Australia export to the world market, positive relation to Sweden, the UK and Netherland. Junnan (2012) investigates short run and long run effects of volatility of real exchange rate on exports from New Zealand over the period of 1991q1-2001q1, using ECM and co-integration approaches. His finding reveals that exchange rate volatility has a weak effect in the short run, but significant negative effect on the export to New Zealand. Lubunga and Kiiza (2013) investigate the effects of real exchange rate volatility on bilateral trade between Uganda and seven of its major trading partners. The result shows both positive and negative impacts of exchange rate on trade flow of Uganda.

Nadir (2011) examines the effect of exchange rate volatility on international trade of Uzbekistan over the period of 1999 to 2009, using Johansen co-integration. His result support negative effect in the short run dynamic, but the improvement in trade represents by depreciation in the exchange rate is positively affected. Muhammadi and Taghavi (2011) provided evidence of the effect of exchange rate volatility on Iranian' import from 1959 to 2009 using TARARCH model. The study reveals that exchange rate volatility has a significant negative impact on imports whereas; import demand is positively affected by domestic income. Cloud (2008) examines the impacts of exchange rate volatility on South African's trade using monthly data 1975- 2007 and

gravity equation model. The study found no evidence of a robust first order detriment effect of exchange rate volatility on both aggregate exports and trade flow.

Arize et al. (2000) investigate the effect of real exchange rate volatility on the exports of thirteen least developed countries using Johansen multivariate and error correction model, the data covers period from 1973 to 1996. The result shows a significant negative impact of exchange rate volatility on exports. Lira (2008) examines the real exchange rate volatility on bilateral trade between South Africa and US for the period between January 1995 to February 2007 using ARDL bounds test approach the evidence reveals significant negative impact of the exchange rate volatility on South Africa's export to US. Hassan (n d) examines the impacts of real exchange rate volatility on the flow of export from turkey, he employs co-integration and error correction (ECM) model. His result reveals that real exchange rate volatility is negatively affect export of turkey. Iraj et al. (2012) examines factors that affecting Gross domestic product(GDP) of two countries, (exchange rate volatility and relative prices on bilateral trade between Turkey and Iran) using VAR approaches and annual data from 1980 to 2009. Their result shows that Iran's GDP has a significant positive impact on bilateral exports both countries. This case is also true for the impact of on Turkish GDP on imports. Relative prices have no significant effect on exports and imports lastly, exchange rate volatility has a significant positive impact on bilateral export and import functions.

Srinivasan and Kalaivani (2012) employs Autoregressive distributive lag (ARDL) bound test in examines the impact of real exchange rate volatility on real export growth of India for the period of 1970 to 2011. The study reveals that real exchange rate has negative effects on in the short run, but positive effect in the long run on export. Hence, foreign income exerts significant of positive and negative in the short run and long run, respectively. Jayanthakumaran and Batsman (2006) investigate the impact of exchange rate volatility on Indonesia's export of priority goods to US for the period of 1997m1 to 2008m12 using ARDL approach. The study reveals that exchange rate vitality has a positive effect in the short run and negative effect in the long for Indonesia's export.

Christina et al. (2003) examined the relationship between exchange rate volatility and trade using a model in which both causalities are considered, also allows identification of the exchange rate impact on trade. The identification structure was used for disaggregate product trade for large numbers of countries covers period from 1970 to 1997. They found that real exchange rate volatility depress trade flow of differentiated goods, but the effect size is very small and unevenly distributed. For developing countries, their manufacture for exports may be much largely affected because of the high exchange rate volatility and large sensitivity of their export to the volatility.

Bahmani-oskoe and Kovyrylova (2008) employs co-integration and error correction to examine the impact of exchange rate volatility on trade flow. Using disaggregate import and export of 177 commodities traded between United States and United Kingdom, for the period of 1971-2003. Their result reveals that the exchange rate has a short run effect on import and export of 109 and 99 industries respectively, and in most cases the effect is negative. In the long run is reduces to only import of 62 and export of 86 industries.

Igor Cesarec (2012) examines the relationship between exchange rate volatility and export revenues from industrial level. The data were acquired from 188 countries between 1991 and 2006. His result is robust to relax assumptions about the structure of the error term, using an alternative measure of currency misalignment and employing a first-difference method of estimation to control for non-stationary in the data. His evidence supports the notion of heterogeneity between industries in the elasticity of export revenues to currency misalignment, but he further explained that the result is much more delicate and should be interpreted with care. Particularly, heterogeneity is greatly reduced when the first-difference method is used. Therefore, suggested further research into this particular aspect, in order to be able to make stronger statements about heterogeneity.

Joseph et al. (2006) used annual sectorial data for the year 1989 to 2001 in examines the impact of exchange rate volatility on the volume of US bilateral trade.

They group the sector base on economic and econometric criteria. The study discovered that grouping of sector into differentiated goods and homogeneous goods gives appropriate sectorial division. They further report that exchange rate volatility has a robust and significant negative effect across sectors, though, is strong for exports of different goods.

Glauco and Andrew (2004) examine the impact of exchange rate volatility on united states (US) exports to the rest of the world and its main trading partners (Mexico, Japan, The UK and, German) for the period of 1987q1 to 20012q2. They employ Autoregressive distributive lag (ARDL). The result reveals that most of the export cases are significantly affected by the exchange rate volatility, although; the magnitude varies across the market destination.

Christopher and Mustapha (2009) investigate the impact of exchange rate volatility on international trade flows in the Euro zone for the period of 1980-2006, using co-integration and bivariate GARCH-M method. The study shows that exchange rate volatility has no significant impacts on both industrialized and newly industrial countries trade flows. But, bilateral volatility is higher than GDP volatility in all countries.

Myint et al. (2010) examine the impact of real exchange rate volatility on export of five emerging economy in east Asian countries and thirteen industrialized countries for the period of 1982q1 to 2006q4 using co-integration and GMM-V method. The result shows that exchange rate volatility has significant impact on the export of the countries.

Adubi and Okunmadewa (1999) employ vector auto correction regressive model to examine price and exchange rate volatility on the export of Nigeria agriculture products for the period of 1986 to 1993. The result reveals that exchange rate volatility has a negative effect while price volatility has a positive effect on agricultural exports.

Shehu and Youtang (2012) examine the causal relationship between exchange rate volatility (ERV), trade flows and economic growth of Nigeria, based on a time series data over the period of 1970-2009. The result indicates significant effects of ERV on trade flows and economic growth of Nigeria. The finding support the preference of

flexible exchange rate regime over the fixed regime as it facilitates more trade flows in Nigeria.

Oyivwi (2012) investigates the impact of real exchange rate volatility on imports of Nigeria, using Johansen co- integration and parsimonious ECM model. The result reveals that real exchange rate volatility has no significant effect on Nigeria's imports. And devaluation as a policy instrument to reduce the trade imbalance has not discouraged massive importation.

Ben and Godwin (2010) investigate the effect of exchange rate reforms on Nigeria's trade performance during the period 1986-2007, using standard export and import demand models. They found a small positive effect of exchange rate reforms on non-oil exports through depreciation of exchange rate. And the structure of imports, in which pro-consumer goods remained unchanged even after the adoption of exchange rate reforms.

Aliyu (2008) employs Johansen co-integration approach to investigate the impact of exchange rate volatility on non-oil export flows from Nigeria. The data were fetched from some key variables, covered the period from 1986 to 2006. His result revealed that the exchange rate has negative impact on non-oil exports.

CHAPTER 3

DATA DESCRIPTION AND MODEL SPECIFICATION

3.1 Concept of Volatility

Modeling of exchange rate volatility gained more attention in research since the evolution of flexible exchange rate regime. There is no consensus in the literature of the studies, concerning the effect and factors that influence high movement of the exchange rate. Many studies have attempted to examine the feature of exchange rate movement in the context of volatility clustering. Extensive works has been carried out in the developed countries with various model specifications. Despite such effort little attention have been paid to developing countries especially, least developing country. However, most of studies are suggesting that exchange rate volatility could largely explain by economic fundamentals; there is a relation between exchange rate volatility and macroeconomic variables (that is, interest rate, money supply, GDP, and inflation) as explained in the work of Arize et al. (2000) and Mark (2009).

It is important to note that the volatility of Exchange rate is always regarded as a risk, whether in asset pricing, portfolio optimization, option pricing, or risk management. And carefully presents of the result for risk measurement could be the input to a variety of economic decisions. Volatility provides an idea of how much the exchange rate can change within a given period of time. Obviously, it is unobservable variable and its measure is a matter of serious contention. Most of the studies considered volatility as an unobservable variable and therefore used a fully specified conditional mean and conditional variance model to estimate and analyze it. Modeling the unobserved conditional variance is one of the most prolific topics in the financial literature which led to ARCH-GARCH developments as stochastic volatility models.

However, some studies suggest that Origin of Volatility might also be dated around October 1987. (Robert 2012) “Modern notion of volatility probably finds its origin in the shocks and the linkages between different markets arising from the 1987 stock market crash”. Obviously, volatility has not been high throughout 1980s, apart from market shock of October 1987 and October 1989. However, growth in the index stock of futures and options trading has not been related to the upward trend in stock volatility. There is evidence showed that computerized trade increases the volatility (William G.; 1990).

Some years ago the stock market suddenly crashes, what became known as ‘black Monday’. During the period, the stock market experienced a drastic fall in the price value of a stock index. Mark (2007) explains that October, 19, 1987 is the day stock market and related futures and option market crash. S&P 500 stock index fall nearly to 20 percent. However, most of the problems occur in the trading system that were related to fall in price worsen the situation, such as difficulties in processing large amount of transaction information at once, which led to the overwhelming of the system, uncertainty of market information that caused withdrawal of many investors from the stock market another considerable factor is the margin call that accompanied the large changes in stock prices. The margin call necessitates the protection of clearinghouse solvency, the size of margin calls and payment period serve in reducing market liquidity.

3.2.1 Data Description

The study uses monthly data covering period from 1999m1 to 2012m12. This time horizon was selected in order to avoid any problem that might arise as a result of a change in exchange rate policy of Nigeria and to suit the effectiveness of the method that will be used in the study of the long run relationship (ARDL approach). Figure 1 below is log of real export of Nigeria. The data were obtained from World Bank. Figure 2 is foreign income proxy by industrial production index. The series used is the weighted figure of industrial production index of major trading partners of Nigeria

namely United States, India and EU 27. The time series data of industrial production index for the United States and India were obtained from United states bank reserve, while data for EU27 were acquired from Eurostat.

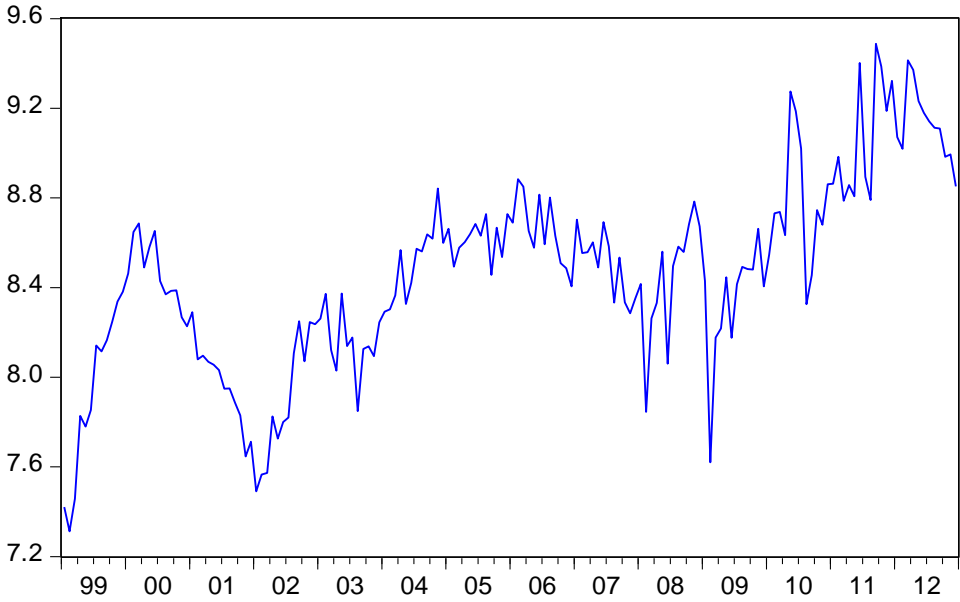


Figure 1: Nigeria Real Export

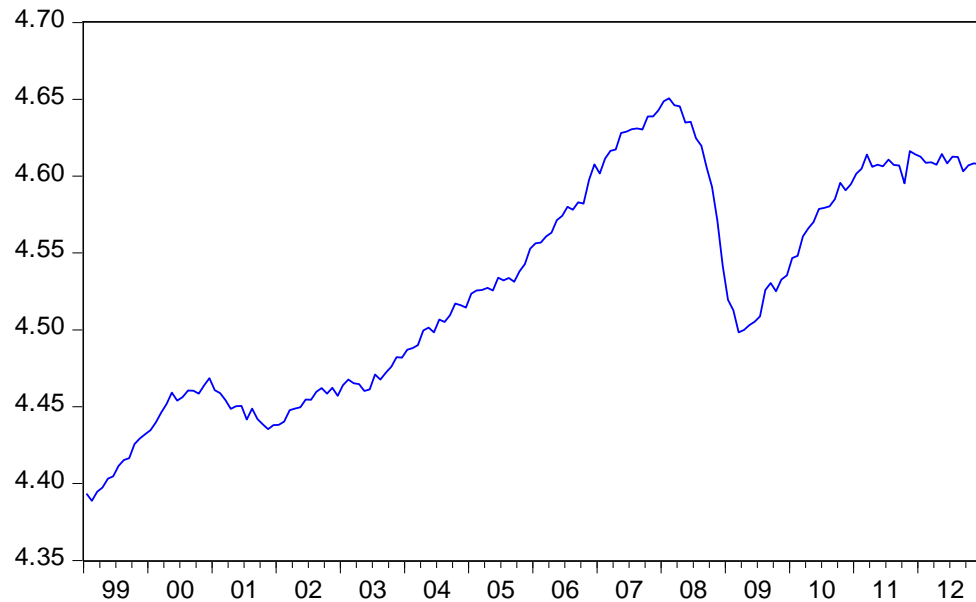


Figure 2: Foreign Industrial Production Index

3.2.2 Real Exchange rate estimation

The nominal exchange rate between Nigeria (Naira) and U.S (dollar) and consumer price index (CPI adjusted to 2005 base year) of Nigeria were acquired from various issues of financial bulletin of central bank of Nigeria. U.S CPI adjusted to 2005 base year was obtained from the US bureau of labor statistics. The real exchange rate is estimated in relation to the theory of purchasing power parity (PPP) which is computed as follows

$$RER = e_{nominal} * \left(\frac{CPI_{foreign}}{CPI_{domestic}} \right) \quad (1)$$

¹¹ The Log in both Nigeria real export foreign industrial production index was obtained from Evie 7

3.3.1 Model Specification

In conventional econometric analyses ARCH family of models used in modeling exchange rate volatility. One of the most significant issues to be considered before modelling is to test for the evidence of ARCH effect and serial correlation. That is, heteroscedasticity test and Lagrange multiplier (LM) test. The process begins by getting residual $\{\varepsilon_t\}$ from ordinary least square regression of a conditional mean which may be autoregression (AR), moving average (MA) or combination of both (ARMA) as the case may be.

3.3.2 Autoregressive (AR p)

An autoregressive model of order 1 is express as current value of variable y_t depends on its past value y_{t-1} with error term is written as

$$y_t = \mu + \varphi_1 y_{t-1} + \varepsilon_t \quad (2)$$

In general form an AR (p) model is given as follows

$$y_t = \mu + \sum_{i=1}^p \varphi_i y_{t-i} + \varepsilon_t \quad (3)$$

3.3.3 Moving Average (MA q)

A moving average is a linear equation in which current variable y_t depends on error term ε_t and its previous value ε_{t-1} this is expressed as

$$y_t = \mu + \beta_1 \varepsilon_{t-1} + \varepsilon_t \quad (4)$$

Generally is written as

$$y_t = \mu + \sum_{i=1}^q \beta_i \varepsilon_{t-i} + \varepsilon_t \quad (5)$$

3.3.4 ARMA (p q)

By combining the characteristics of autoregressive (AR) and moving average (MA) gives ARMA (p q), such model can be expressed linearly as

$$y_t = \mu + \varphi_1 y_{t-1} + \dots + \varphi_p y_{t-p} + \varepsilon_t + \beta_1 \varepsilon_{t-1} + \dots + \beta_q \varepsilon_{t-q} \quad (6)$$

Note, for the whole process that is AR, MA and ARMA μ represent constant mean relate to y_t variable and error term ε_t are assumed to be uncorrelated random variables, that is $E[\varepsilon_t] = 0$, $\text{var}[\varepsilon_t] = \sigma^2$ and $\text{cov}[\varepsilon_t] = 0$ for the process to be stationary.

For instance, in the case of ARMA after obtaining the residuals ε_t the next step is to regress on the constant and k lags as is presented in the equation below

$$\varepsilon_t^2 = \alpha + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 \varepsilon_{t-2}^2 \dots + \alpha_k \varepsilon_{t-k}^2 + u_t \quad (7)$$

The null hypotheses for no ARCH effect up to order k can be made in the following form

$$H_0: \alpha_1 = \alpha_2 = \dots = \alpha_k = 0 \quad (8)$$

The alternative hypotheses $H_1 = \alpha_j > 0$, (for some j's)

Where $j=1, 2 \dots k$

3.3.5 ARCH Model

Autoregressive Conditional Heteroskedasticity (ARCH) model is used for modelling and forecasting of volatility. This model allows the behavior of a series to follow different process at a different point in time such as volatility clustering. Furthermore, the movement of the volatility of the exchange rate has attracted numbers of studies due to its economic and financial implication. Mandelbrot (1965) and Fama (1965) explained that the distribution of Asset price is characterized by a numbers of styles 'Fact' that is leptokurtic, leverage effects and volatility cluster. Volatility

clustering in time series exhibit large changes in the price of Assets or currency exchange rate in long period of time followed by small change in a long period of time. In such situation homoscedasticity is inappropriate. Thus, economists have become more interested in the dynamic form of heteroscedasticity. Angel (1982) introduce the first time variance volatility model known as Autoregressive conditional heteroscedasticity, consider a simple statistic regression model in which variable y_t depends on variable x_t

$$y_t = a_o + ax_t + \varepsilon_t, \quad \varepsilon_t \sim N(0, h_t), h_t = \sigma_t^2 \quad (9)$$

σ_t^2 is the conditional variance that can be expressed as

$$\sigma^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \varepsilon_t \quad (10)$$

3.3.6 GARCH model

Since the concept of conditional heteroscedasticity came into being by Engle (1982), different studies have applied and extended the methodology. Similarly, the extension of Generalized Autoregressive Condition Heteroscedasticity (GARCH) models proposed by Bollerslev (1986) has been extensively applied in the analysis of time series. Financial time series that is not properly modeled by ARCH specification that has features of asymmetry or leverage effect as explained in the works of French et al. (1987), Schwert (1990) and Nelson (1991).

¹²The ARCH family models have been extensively discussed as one of standard tool in econometrics empirical oriented researches papers and text books. Refer to Hamilton (1992), Gouriéroux and Jasiak (2001), Gujarati (2003), Harris and Sollis (2003), Enders (2004), Öztürk (2006) for further research

GARCH (1 1) model is most robust of the ARCH-family model; it can easily extend with large number of lags in a variety of ways that is normally generalize to GARCH (p q) model. In the case of additional lag term higher order model is always useful in a long range of data like years, months, days or hours. In modeling persistent movement in volatility with less numbers of coefficients to be estimated in a higher order polynomial $\alpha(L)$, Bollerslev (1986) introduces a conditional heteroscedasticity model that include the use of conditional variance $(h_{t-1}, h_{t-2}, \dots, h_{t-p})$ as regressor in the model for the conditional variance in addition to the lag of squared error term $(\varepsilon_{t-1}^2, \varepsilon_{t-2}^2, \dots, \varepsilon_{t-p}^2)$.

$$h_t = \alpha_0 + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 + \sum_{j=1}^p \beta_j h_{t-j} \quad (11)$$

$$h_t = \alpha_0 + \alpha(L)\varepsilon_t^2 + \beta(L)h_t \quad (12)$$

$$\text{Where } p \geq 0, q > 0, \alpha_i \geq 0 (i = 1, \dots, q) \text{ and } \beta_j (j = 1, \dots, p) \quad (13)$$

The model explains variance of the two different lags, lag (q) is a past squared residual to capture high frequencies while lag (p) is the value of variance that capture long term influence. Bollerslev (1986) proposed a model that is commonly used in GARCH (1, 1) which is simple defines as.

$$h_t = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1} \quad (14)$$

It should also be noted that GARCH (1, 1) will be stationary if and only if, $(\alpha_1 + \beta_1) < 1$

However, GARCH (1 1) model contains intuitive information that is expected in a given data, is a combination of information in long term and the variance from a last period adjustment in order to include the size of shocks observe. Thus, the above equation is written as:

$$h_t = \alpha_0(\varepsilon_{t-1}^2 - h_{t-1}) + (\alpha_1 + \beta_1)h_{t-1} \quad (15)$$

The coefficient (α_1) measures extent at which today's volatility shock feeds through next period volatility. $(\alpha_1 + \beta_1)$ Measures the rate at which the volatility effect decay over time in other words, α_1 is the ARCH parameter which represents the rate of instantaneous response of the volatility to shocks, high α_1 Mean volatility response fast to market movement. Coefficient β_1 is the GARCH parameter that represents persistent volatility and high β_1 shows persistent increase in the volatility.

3.4.1 Export Model

The basic aim of this research is to examine the effect of long run relationship between exchange rate volatility and exports of Nigeria. Mc Kenzie (1999) suggests that a standard model with sufficient variables is adequate for analyses, though many of previous researches included a number of various explanatory variables. The research follows Bakhromov (2011) to specify its export model as follows.

$$EX = F(Y_F, RER, V) \quad (16)$$

Where EX is aggregate real exports, Y_F account for foreign income, RER is relative price exports proxy by real exchange rate and lastly, V is volatility of real exchange rate.

Furthermore, fundamental economic theory explains that foreign income has a high effect on the volume of domestic exports that is, rise of foreign income consequently result in increases demand for domestic exports. If the exchange rate falls in favor of domestic export price, it makes domestic product to be more competitive than foreign goods in the foreign markets thus in such situation domestic traders are expected to increase their export activity.

As early explained in the literature, the impact of exchange rate volatility and trade is mixed. De Grauwe (1988) opines that the risk-averse trader will export more goods due to high exchange rate uncertainty (volatility) which may cause an increase in the total trade while in the case of risk neutral traders will export fewer goods which may result to less export to be traded. In short, impact of exchange rate variability on exports may be positive or negative.

3.4.2 Autoregressive Distributive lag (ARDL) model

Understanding economic impact of how variables affect each other required analyses of the long run relationship among the said variables. When variables are considered followed trends (no stationary), the fundamental principles in time series analyses required that such variables to be de-trends in order to be stationary (Shitu, et al. 2012). However, inference and estimation regarding the relationship and properties of the series will be model using a recent econometric approach Autoregressive distributive lag (ARDL) proposed by pressure et al. (2001).

ARDL model is Autoregressive in the sense that the dependent variable $\{ Y_t \}$ is explained by its own lagged $\{ Y_{t-1} \}$ and also having a distributive large component in the form of successive lag $\{ x_t \}$ independent variable (Giles, D., 2013). The model enjoyed several advantages over conventional cointegration technics. Firstly, ARDL is superior over conventional when is use on a small sample size. Secondly, it allows both short run and long rung relation to be tested simultaneously. Thirdly, the approach provides unbiased estimates for long runs and valid t test when some regressors are endogenous. And fourthly, the variables are tested irrespective of whether a variable is difference of order zero or order one (Srinivasan and Kalaivani, 2013). The ARDL model is written as follow

$$Y_t = \alpha + \phi_t Y_{t-1} + \beta_t X_{t-1} + \varepsilon_t \quad (17)$$

Where Y_{t-1} and X_{t-1} are time series variables, ε_t is the vector of the stochastic error term. Generally the model can also be defined as ARDL (p, q) the p and q are lag of the parameter which forms the following equation

$$y_t = \alpha + \sum_{i=1}^p \phi_i y_{t-1} + \sum_{j=0}^q \beta_j x_{t-1} + \varepsilon_t \quad (18)$$

In view of the above explanation, the ARDL use in this study present in the form express in the equation below

$$\begin{aligned} \Delta \ln EXP_t = & \alpha + \sum_{t=1}^m \phi_1 \ln FDX_T + \sum_{t=1}^p \phi_2 \ln RER_t + \sum_{t=1}^q \phi_4 \Delta \ln V_t + \sum_{t=1}^r \phi_5 \Delta \ln EXP_{t-1} \\ & + \alpha_1 \ln EXP + \alpha_2 \ln FDX + \alpha_3 \ln RER + \alpha_4 \ln VOL + \varepsilon_t \end{aligned} \quad (19)$$

EXP represent Nigeria export, RER is real exchange rate of Naira to dollar, FDX is the foreign income proxy by the industrial production index of Nigeria major trading partners, VOL is the volatility, α is intercept, t is the time dimension while Δ is difference operator, and ε_t is the error term. Depreciation in real exchange rate may result in an increase in the export due to the relative price effect therefore, the expected sign is positive. However, the relationship between volatility of exchange rate and export is mixed. In the case of foreign income, one will expect increases in the income of trading partners to cause a greater increase of export, the relationship is positive. Thus, the expectation is that $\phi_1 > 0$, $\phi_2 > 0$ and $\phi_4 < 0$. The long run cointegration is estimated using equation below

$$\begin{aligned} \ln EXP_t = & \alpha + \sum_{t=1}^m \phi_1 \ln FDX_T + \sum_{t=1}^p \phi_2 \ln RER_t + \sum_{t=1}^q \phi_3 \ln V_t + \sum_{t=1}^r \phi_4 \ln EXP_t \\ & + \varepsilon_t \end{aligned} \quad (20)$$

The selection of ARDL maximum lag (p q) is based on Akaike selection criterion (AIC). We derive the short run dynamic parameter from error correction model (ECM) estimation, associated with the long run estimate.

$$\Delta \ln EXP_t = \alpha + \sum_{t=1}^m \phi_1 \Delta \ln FDX_{T-1} + \sum_{t=1}^p \phi_2 \Delta \ln RER_{t-1} + \sum_{t=1}^q \phi_3 \Delta \ln V_{t-1} + \sum_{t=1}^r \phi_4 \Delta \ln EXP_{t-1} + \delta ECM_{T-1} + \varepsilon_t \quad (21)$$

In the equation (21); ϕ_1, ϕ_2, ϕ_3 and ϕ_4 Are short run dynamic coefficients converging to long run equilibrium while δ is speed of adjustment parameter and error correction model is term originated from the estimated equilibrium relationship of equation (20)

3.4.3 Bound test

Bound test normally modelling the ARDL equation by the use of least square procedure, in order to investigate the existence of the long run relationship among the variables That is, F-statistics test is conducted for the joint significant of the coefficient of lag variables, $H_0: \phi_1 = \phi_2 = \phi_3 = \phi_4 = 0$ against the alternative $H_1: \phi_1 \neq \phi_2 \neq \phi_3 \neq \phi_4 \neq 0$. The calculated F- statistics is compare to critical value table generated by Pesaran et al. (2001). If the F-statistical value lies above the bound of critical value, the null hypotheses is rejected contrary. If the F-statistic value falls below the lower bound of critical value, the null hypotheses cannot be rejected that is, there is no long run relationship among the variables however. If the F-statistic value lies within the bound test the result is inconclusive.

CHAPTER 4

EMPERICAL ESTIMATION AND ANALISES OF THE RESULT

4.1 Real Exchange Rate Volatility Modeling

4.1.2 Unit Root Test

Before modeling of real exchange rate volatility, checking for stationary of the series is important in order to be sure of the properties of the series under consideration. Time series analysis assumes stationary of data in order to be able to employ ordinary least squares (OLS). Lack of stationary of data may lead to inappropriate statistical results, erroneous or misleading inference. This research employs Augmented Dickey-fuller, Philips-Perron and Ng-Perron tests to test the log of real exchange rate (LEXC).

The table 1 below is real exchange rate unit root test result. The Augmented Dickey-Fuller (ADF) test shows that the t statistics is greater than the critical value in absolute value at the level. Therefore, the null hypotheses can be rejected; the variable is stationary at level. That is, the series is I (0). In the case of Philips-Perron test, the calculated t statistic is less than the critical value at 1%. Therefore, the null hypotheses cannot be rejected, suggesting that the variable is not stationary at level. The calculated t statistic is greater than the critical value at 1% level in absolute value at the first difference; the series is stationary at first difference. That is, the series is I (1).

Table 1: Unit Root Test For Real Exchange Rate

Augmented Dickey-fuller (ADF) Test result				
LEXC value	-4.2757	Δ LEXC value	-10.4152	
1% significance level	-4.0143	1% significance level	-4.0143	
5% significance level	-3.4371	5% significance level	-3.4371	
10% significance level	-3.1427	10% significance level	-3.1427	
Phillips- Perron (PP) Test result				
LEXC value	-3.7452*	Δ LEXC value	-10.2165*	
1% significance level	-4.0139	1% significance level	-4.0139	
5% significance level	-3.4369	5% significance level	-3.4369	
10% significance level	-3.1426	10% significance level	-3.1426	
Ng- Perron Test result				
	MZa	MZt	MSB	MPT
LEXC	-5.6393	-1.6253	0.2882	16.0487
Δ LEXC	-79.1083	-6.2877	0.0795	1.1584

Ng-Perron critical value for MZa, MZt, MSB, and MPT respectively

1% significant level -23.800,-3.420, 0.143 and, 4.030

5% significant level -17.300, -2.910, 0.168 and, 5.480

10% significant level -14.200, -2.60, 0.185 and, 6.670

*, indicates significant at 1%

According to Ng-Perron test the MZa and MZt test for null hypothesis indicate that the time series has unit root. The MSB and MPT test for null hypotheses also implies that the series is not stationary at level. MZa and MZt test shows that calculated t for LEXC is less than critical value. MSB and MPT test calculated t statistics is greater than the critical value; both tests are suggesting that the variable is not stationary at level. in the first difference, MZa and MZt test show that calculated t statistics for Δ LEXC is greater than critical value at 5% level, MSB and MPT test also shows that calculated t

statistics for ΔLEXC is less than critical value at 5% level. Both tests suggesting that the variable (LEXC) become stationary (integrated of order one) after first difference.

In summary, ADF test result reveals that the variable is stationary at level, whereas PP test and Ng-Perron test, show that the variable is stationary at different. Based on the result of PP and Ng-Perron we conclude that the series is stationary at the difference, that is, the series is $I(1)$.

4.1.3 ARMA Selection Criteria

The result of ARMA selection carried out, that is AR (1), MA (1) and ARMA (11) models showed that none of the error term is serially correlated. Selection based on Akaike information criterion (AIC) and Schwarz criterions (SC) indicate that AR (1) is superior from other models therefore, is selected as best fitted model.

Table 2: Summary of ARMA Selection Criteria

	AIC	SC
AR1	-4.942594	-4.886353
AR2	-4.756564	-4.737741
MA1	-4.824401	-4.805730
ARMA11	-4.807891	-4.770397

ARCH family model is widely known as nonlinear approach that does not assume constant variance. The model is absolutely efficient in demonstrating how the current level of volatility is correlated with its level during immediate proceed period (volatility clustering). Exchange rate as unobservable phenomena, various researches have used different statistical methods to determine such volatility of exchange rate, this research employs ARCH and GARCH model.

ARCH (p) model allows current conditional variance of the parameter to be depends on the past condition and squared innovation estimated. The model is mathematically estimated as follows:

$$h_t = \alpha + \alpha_1 \varepsilon_{t-1}^2 + \varepsilon_t \quad (24)$$

$$h_t = 0.0003 + 0.2592 \varepsilon_{t-1}^2 \quad (25)$$

$$(0.0881) \quad (0.06) \quad (\text{standard error})$$

GARCH (p q) model is express as follows

$$h_t = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1} \quad (26)$$

$$h_t = 3.56 + 0.546 \varepsilon_{t-1}^2 + 0.626 h_{t-1} \quad (27)$$

$$(0.185) \quad (0.225) \quad (0.357) \quad (\text{standard error})$$

In order to compare the effective performance of ARCH and GARCH model, the optimal selection was made on the bases of Akaike information criterion (AIC), Schwarz criterion (SC) and forecasting compression. ARCH model appear to be fitted and significant in almost all criteria compare to GARCH model, as is shown in the table below.

Table 3: ARCH and GARCH Selection Criteria

	ARCH model	GARCH model
AIC	-4.942594	-4.939302
SC	-4.886353	-4.8643
Root mean square error	0.010884	0.010884
Mean Abs. error	0.008302	0.008302
Mean Abs. percentage error	100.0015	100.0017
Thiel inequality coefficient	0.9910	0.9910

The result of the ARCH model may be interpreted as a prediction of current period's real exchange rate. Therefore, the variance is estimated as a weighted average of constant with ARCH- term, in equation 26. The prediction of h_t presents an estimate of volatility of the Nigeria real exchange rate against the US dollar as is diagrammatically demonstrate in the figure below.

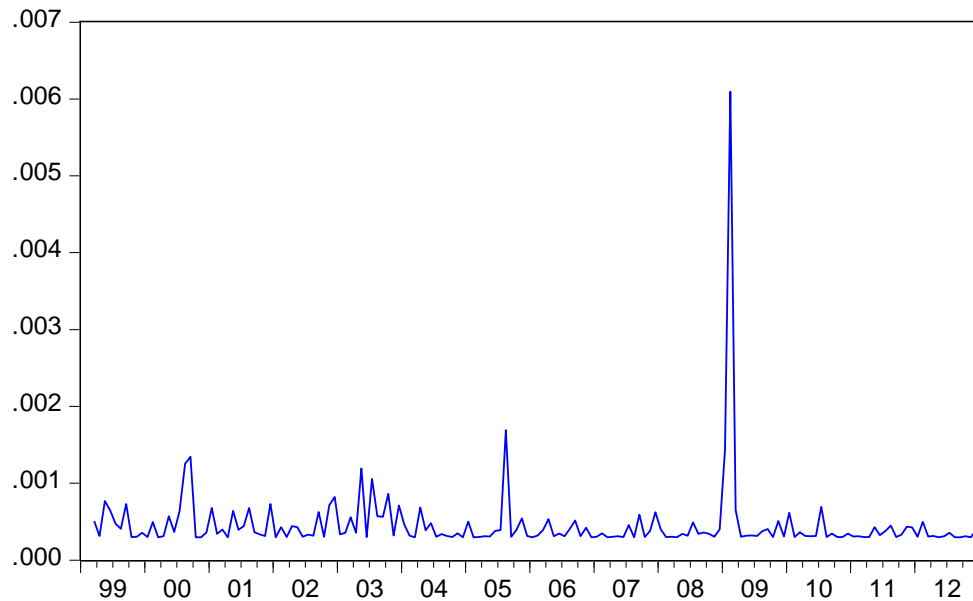


Figure 3: Nigeria Real Exchange Rate Volatility

4.2 Export Result

Before the application of ARDL approach it is important to check the stationery property of the series, despite the fact that the ARDL approach uses series irrespective of their order of integration. But is required that the series should be of the same number of orders that render them stationary that is, all the series must be either I(0) or I(1). However, the test helps in avoiding erroneous use of a series that is I (2) (Libanio; 2005).

Table 4: Augmented Dickey Fuller (ADF) Test Result

Variables at level	ADF model with intercept	Order of integration
LEXP	0.7651	-
LFINDX	-0.4014	-
LREXC	-0.2155	-
V	-10.5866**	(0)

Variables at first difference	ADF model with intercept	Order of integration
Δ LEXP	-3.7920***	I(1)
Δ LFINDX	-11.0494	I(1)
Δ LREXC	-10.0484	I(1)
V	-10.5866**	-

** And *** indicate five and ten percent respectively, using the Mackinnon (1991) finite-sample critical values

However, in table 4 is ADF test result of the variables after converting them into logarithm form. LEXP is logarithm of Nigeria real export figure, LFINDX is logarithm foreign income proxy by production index, LEXC represent logarithm of real exchange rate and v is volatility. However, the unit root tests confirm that all the variables are I (1) with the exception of volatility series which is I (0). Since the variables are I (0) and I (1) order of integration now we can use the ARDL method to test short and long run relationship.

4.2.1 Bound Test for Cointegration

Prior to co-integration test, bound test was carried out for the Nigeria export model. The optimal dynamic structure was selected by ensuring absence of serial correlation and on the bases of Akaike information criterion (AIC) for conditional ARDL ECM.

Table 5: Bound Test Result

Computed F-Statistics	Critical Value	
	Lower Bound	Upper Bound
Export model: 7.77*		
1% significance level	3.95	5.83
5% significance level	3.07	4.19
10% significance level	2.65	3.71

* indicate that the computed f-statistics lies above one percent upper bound value. The bound values are acquired from Pesaran, et al (2001).

The table above is the result of the bound test. The result reveals that the computed F-statistics value of export model (7.7667) lies above the critical value of 5.83 at one percent significance. Therefore, the null hypotheses of no co-integration can be rejected. There is stable long run relationship among the variables. In other words, the variables cannot move independently and there is some adjustment that occurs in the short run that prevent enlargement of error in the long run.

4.2.2 Short run Dynamic for ARDL Process

The table below is the estimated coefficients of short run dynamic associated with the long run. The maximum lag length selection is determined by the Akaike information criterion (AIC)

Table 6: Error Correction Model Result For $\Delta LEXP$

Regressor	Coefficient	t- Statistics	P. value
Constant	-3.942	-1.490	0.138
$\Delta LEXP_t$	-0.323	-3.467**	0.001
$\Delta LEXP_{t-1}$	-0.189	-2.250**	0.026
$\Delta LFIDX$	0.250	0.191	0.841
$\Delta LEXC$	-0.013	-0.029	0.0977
V	-0.051	-2.312**	0.022
ecm_{t-1}	-0.204	-2.743**	0.007

** indicates five percent significant levels.

The result shows that estimated error correction is negative and significant at five percent level, which confirms the existence of long run adjustment process from the short run deviation. The estimated coefficient indicates that 20 percent of deviation from the equilibrium of the past period shock will converge to long run equilibrium in the present period. Besides, the result also reveals that the short run impact of exchange rate volatility on the real export is negative and significant at five percent. This falling in the volume of Nigeria's export may also be as a result of lack of, if any, effective hedging instrument which coursed risk-averse profit maximization firm to reduce their export at the period of high volatility uncertainty. Another reason could be a continuous

¹³ An algorithm developed by M. Qamarul Islam. (Statistics Professor, Department of Economics, Çankaya University, Ankara- Turkey) is use for both short run and long run measurement.

depreciation of the Naira against the US dollar, and the dollar has gained consistent value over a long period of time against Naira due to instability in Naira. One of the adverse effects of weak depreciation of the exchange rate and inflation is that, it discourages exportation due to continuous increase in the production cost, and causes supply side constraint. This may also be as a result of poor infrastructure and inconsistent and weak supportive economy and monetary policy among others

4.2.3 Long run Estimation of ARDL Process

Once cointegration among variable is confirmed, we proceed to estimate the long run equilibrium coefficient of ARDL model.

Table 7: Result of Long Run Coefficient Using the ARDL (2, 0, 0, 0) Approach

Dependent variable LEXP			
Regressor	Coefficient	t-statistics	P. value
Constant	-19.325	-1.942***	0.054
LFIDX	2.193	1.284	0.201
LREXC	2.154	4.052*	0.000
V	-0.348	-1.701***	0.091

*, *** indicates significant at one percent and ten percent level respectively

The above result reveals that the impact of volatility of exchange rate on real exports is negative and significant, that is higher rate of exchange rate fluctuation affect Nigeria's exports activity. The risk associated with high volatility discourages economic agents from embark on trade across boarder, because high volatility creates uncertainty which increase cost to risk averse trader, and by favoring trade at margin .However, the finding support the assertion that exchange rate risk reduces trade, which is consistent with work of Hooper and Kohl Hagen (1978) and Srinivasan and Kalaivani (2013). The

result of real exchange rate is positive and significant. Impliedly, depreciation of domestic currency will stimulate foreign demand and make Nigeria's export competitive, but substantial decrease in exchange rate may seriously have a supply side effect by way of causing increase in the cost of production at industrial level. The result of foreign income is positively related to export, but not significant, meaning that foreign income of the trading partners doesn't play crucial role in stimulating Nigeria exports.

There are some studies that attempt to investigate the impact of nominal exchange rate on trade. Aliyu (2008) examines the impact of Naira and dollar nominal exchange rate on Nigeria non-oil export using quarterly time series data from 1986q1 to 2006q4. He discovered that nominal exchange rate of naira decreases non-oil export of Nigeria while the nominal exchange rate of dollar increases the non-oil export of Nigeria. Jarita (2008) investigates the effect of nominal exchange rate shocks on price of import and export of Malaysia. The result reveals that nominal exchange rate shock affects the import price of Malaysia. In line with the above studies, this research investigates the impact of nominal Naira exchange rate on the Nigerian export of Nigeria, for the same period of 1999m1 to 2012m12 using ARDL(1, 8, 9, 4).

The Bound test shows that there is a long run relationship between the variable. The short run dynamic indicates that the ECM is negative and significant at one percent and the coefficient confirms that 36% of the deviation in the last period will be steady and stable adjusted to equilibrium so that, the variables do not diverge in the long run. On the side of independent variable only volatility has a positive and significant impact on export. This shows that in the short run, high volatility stimulate economic agent to export more, is consistent with the conclusion of Aziakpo et al (2005) and Caglayan (2008). They concluded that high exchange rate volatility to some extent that increases, should also increase trade when the exporters are sufficient risk averse. A rise in exchange rate volatility should increase risk-averse trader's marginal utility of export revenue as an incentive for them to increase their export activities in order to maximize revenue. The result for long run relationship coefficient also shows that foreign income

positive and significant to the export of Nigeria impliedly, a rise in the foreign income plays a vital role in stimulating export activity of Nigeria. In other words, higher income level of trading partners lead to an increase in purchasing power of the country, thereby influence more export from Nigeria.

CHAPTER 5

SUMMARY AND CONCLUSION

The basic aim of this research is to empirically examine the impact of real exchange rate volatility on Nigeria export. Studies related to exchange rate management still remain of important to the economist and policy makers, especially in developing countries due to their high vulnerability to the world volatility. Large numbers of research that have endeavored to analyze the impact of exchange rate volatility on export uses different sample period, model specification and form of proxies for the variable, resulted in diverse of evidences, which indicate that the relationship between exchange rate volatility and export is ambiguous. Besides, previous studies employ ordinary least squares (OLS) under erroneous and strict assumption that all variables under consideration have unit root that is, integrated of first differences. In line with the work of De Vita and Abote (2004) and Srinivasan and Kalaivani (2013), this study adopts an advance method proposed by Peseran et al. (2001) in investigating the relationship between real exchange rate volatility and export of Nigeria.

Some literature suggest that macroeconomics variables that have been volatile by themselves around 1980s, improvement in technology, and increase in cross border trade are the roots for high fluctuation of exchange rate (Clack; 1975, Salvatore; 2004; Ozturk; 2006 and Claude; 2007). In another vein, William (1990) argued that the volatility of the exchange rate can be traced around 1970 when the stock market with the related future and foreword suddenly crash, which became known as “black Monday”. Many studies investigate the exchange rate volatility in context of volatility clustering particularly in the developed countries. However, less attention has been given to developing countries. In recent years there has been an armful increase in the study of the movement of exchange rate volatility and stock market returns in the

context of volatility clustering and persistent, leverage effect among others. (Jones and Kennan; 1990 and Salvatore; 2004) Exchange rate is highly volatile in the short run response to changes in the price of goods, whereas in the long run is more related to political events, monetary policy or expectation. However, the risk associated with its transaction has substantially increased due to high swing in the recent years, so also the awareness and there are also better developed financial instrument such as future and forward to cover such risk. In international trade, financial transaction is larger than trade flow, which signifies that the exchange rate is more related to financial transaction than trade flow. However, high volatility increases the trade cost of trader, because the agreement on the exchange rate reaches at the time of trade while the payment is effected later in the period of delivery. Besides, the risk related to exchange rate is embedded with two effects that substitution and income which moves in an opposite direction.

Nigeria has undergone significant changes with respect to the management of the exchange rate since independence, from pegging arrangement with single or basket of currencies to float rate in the 1986, during the period of SAP. Despite the effort put in place to achieve a realistic Naira exchange rate, there was no reflection of the performance in the real sector of the economy instead, Naira continue to depreciate in value; increase in the importation of consumption goods and demand pressure on the foreign market, depleting external reserves. In recent years, CBN has been working tremendously to ensure; realistic exchange rate of Naira in the foreign market, a healthy external reserves and balance of payment position by putting several measures such as the introduction of inter-bank foreign exchange rate market (IFEM) and Dutch auction system (DAS).

In the empirical side, the study started by modeling real exchange rate volatility. We first check the stationary properties of the real exchange rate (LEXC) using; Augmented Dickey-fuller (ADF) test, Philip Perron (PP) test and Ng- Perron test. The result of the ADF test shows that the LEXC is stationary at level. The PP and Ng Perron

reveal that the LEXC is stationary at one percent level after the difference. Based on the PP and Ng Perron test results, we concluded that the variable is stationary in the first difference that is $I(1)$. The ARMA criteria selection reveals that AR (1) is fitted model. The volatility was modeled using the ARCH model.

Evidence from unit root test prior to cointegration measurement, confirmed that all the variables are $I(1)$ with the exception of volatility which is $I(0)$. This implies that the ADL approach employed is the most appropriate approach in this context. The bound test result confirms that export is cointegrated with real exchange rate, volatility of exchange rate and foreign income activity. The result of long run is consistent with the hypotheses and economic theory. Based on the findings, the real exchange rate volatility has a significant and negative effect on the export in the long run; this shows the high fluctuation of exchange rate volatility hinders Nigeria's export activity. The real exchange rate shows positive and significant effect on the export in the long run, while in the short run the export negatively affect Nigeria's exports, this implies that depreciation of Naira exchange rate is more effective in the long run to stimulate export activity in Nigeria whereas, in the short run depreciation of the Naira negatively affect the Nigeria export. In the case of foreign income, the empirical result exerts no significant impact on the Nigeria export.

Furthermore, the study also investigated the relationship using nominal exchange rate. After investigating the unit root property of the nominal exchange rate, the criteria selection carried out indicates that Egarch is best fitted model. The result of bound test shows that the export is cointegrated with the nominal exchange rate, volatility of nominal exchange rate and foreign income. Short run dynamic result confirms that ECM is negative and significant and the coefficient indicates that 36% of previous period will stable adjust to equilibrium in the present period. Volatility of nominal exchange rate is also positive and significant which indicate that in the short run, high volatility encourage the traders to increase their export of Nigeria. This evidence is consistent with the conclusion of Aziakpo et al. (2005) and caglaya (2008). The long

run coefficient ARDL (1, 8, 9, 4) model shows that foreign income is positive and significant related to the export. In other words, a rise in the income of the trading partners encourages export activity of Nigeria.

Considering the differences in the evidence between the real exchange rate and the nominal exchange rate, this study suggests, in line with the previous literature of Baum (2010) and Bakhromow (2011) that the relationship between exchange rate volatility and export is mixed, because the empirical evidence is more sensitive to the choice of form of proxy for exchange rate exchange rate volatility. In the side of real exchange rate volatility, the study conclude that volatility of exchange rate has negative impact on export activity of Nigeria, this may be as a result in effective exchange rate market and continuous depreciation of Naira against dollar.

The study recommends that the central bank of Nigeria (CBN) should pursue sustainable and stable exchange rate policy and other strong measures to promote greater stability that will accelerate the enhancement of Nigeria export growth. There is also need for policy maker to always consider the exchange rate level, prior to implementation of any financial policy in relation to exchange rates. The CBN should also consider taking control of short run depreciation of Naira due to its adverse effects on export. Government should provide the require infrastructure such as; good road and energy among other, and good atmosphere that will encourage production for export in Nigeria.

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