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EXCHANGE RATE FLUCTUATION AND EXPORT PERFORMANCE IN NIGERIA (1961-2011)

BY

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CERTIFICATION

This project has been approved as satisfying the requirements of the department/ faculty of management and social sciences, Caritas University Enugu State for the award of Bachelor science (B.S.C) degree in Economics.

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DEDICATION

This research is dedicated to Almighty God, the giver of life, wisdom and understanding for His infinite mercy and grace.

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Monetary indebtedness in writing, stating when to pay, at a future date is legal and customary to be acknowledged. But monetary and non-monetary indebtedness that cannot be refunded is natural and Godly to be acknowledged physically by expressions of gratitude and appreciation.

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ABSTRACT

This paper "exchange rate fluctuation and export performances in Nigeria" aim to determine the effect of foreign exchange dynamism on the country's export performance from 1961-2011. Research results from the economic tool of regression analysis obtained shows that fluctuations in the naira exchange rate affect manufacturing and agricultural exports more than it affects oil export. To reduce the impact of this fluctuations on these export, monetary authorities in Nigeria should stabilize the naira exchange rate through monetary and fiscal policies, exporters should take advantage of the futures worked to eliminate the negative effects of this fluctuations on export income and performance, and fiscal and monetary policies should be initiated by the government to increase local production to meet local consumption, reducing foreign exchange demand for import consumption and reduce pressure on the naira exchange rate.

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CHAPTER ONE

1.0 BACKGROUND OF THE STUDY

Exchange rate is a prominent determinant of world trade, receiving much attention in the context of global imbalances. The subject of exchange rate fluctuation came to be a topical issue in Nigeria because it is the goal of every economy to have a stable rate of exchange with its trading partners. In Nigeria, this goal was not realized in spite of the fact that they embarked on the devaluation of the naira and adopted the Structural Adjustment Program (SAP) in 1986. The failure to realize this goal subjected the Nigerian manufacturing sector to the challenge of a constantly fluctuating exchange rate.

One objective of the SAP was the restructuring of the production base of the economy with a positive bias for the production of agricultural export. The foreign exchange reforms that facilitated a cumulative depreciation of the effective exchange rate were expected to increase the domestic prices of agricultural exports and hence boost domestic production.

Empirically many researchers like Oyejide (1986), Ihimodu (1993) and World Bank (1994) analyzed the effects of cumulative depreciation of the effective exchange rate, as it resulted in the change in the structure and value of Nigeria's exports. The depreciation increased the prices of agricultural exports and the result indicated a worked increase in the volume of agricultural exports over the years. However, very little achievements were made in stabilizing the rate exchange. As a consequence, the problem of exchange rate fluctuations in Nigeria persists up till date.

Fluctuation is a major constraint on development of an economy, making planning more problematic and investment more risky. For instance, fluctuation in exchange rate may reduce the activities of potential investors in Nigeria because it increases uncertainty over the returns of a given investment. Potential investors will invest in a foreign location only if the expected returns are high enough to cover for the currency risk (Gerado, 2002). Risk in international commodity trade usually arises from two main sources; changes in world prices or fluctuation in exchange rate. Therefore, understanding the behavior of the exchange rate is very important for many reasons. First, the relationship between a country's exchange rate and economic growth via trade is a crucial issue from both the descriptive and policy prescription perspective. As Edwards (1994; 61) asserts; "it is not an overstatement to say that the issue of real exchange rate behavior now occupies a central rate in policy evaluation and design". A country's exchange rate behavior is an important determinant of the growth rate of its exports and it serves as a measure of its international competitiveness (Bath and Amusa, 2003), Chukwu (2007)observed the instability exchange rate as a determinant of trade in Nigeria; having a positive influence on export trade and at other times a negative influence. This suggests an erratic change in its value having a long-run effect on export and economic growth. This research aims to determine the impact of fluctuations in the naira exchange rate on Nigerian's export performance.

1.1 STATEMENT OF THE PROBLEM

Despite the existence of literature on the influence of exchange rate fluctuations on exports in Nigeria, theoretical and empirical works on the subject are yet to produce a consensus. The two major trends in the literature review indicate thus; the first argues that exchange rate fluctuations represent uncertainty and will impose costs on risk- adverse economic agents which as a result respond by favoring domestic- foreign trade just at the margin. In other words, it might hamper the growth of international trade (Chowdhury, 1993, Cushiman, 1983, 1988 Kenen and Rodrik, 1986). The second strand of literature argues that if the economic agents are sufficiently risk lovers, an increase in exchange rate raises the expected marginal utility of export revenue and thus induces them to increase their exports in order to maximize their revenue. Therefore, exchange rate fluctuations may actually catalyze trade flows (De Grauwe: 1988, IMF: 1984, Klein: 1990 and Chambers, R. G. and Just, R. E. (1991). Only few attempts have been made to examine them for developing countries, Nigeria inclusive because of the lack of reliable time –series data. The available instances include Vergil (2002) for turkey and Bah and AMUSA (2003) and Takendesa, (2005) for South Africa, Ajayi (1988), Adubi, A. A. and Okunmadewa, F. (1999), Osagie (1985) for Nigeria.

The research will differ from the existing ones as it will carefully examine exchange rate fluctuations and export for both the oil sector and non-oil sectors. Previous studies assessed only the influence of exchange rate fluctuation on either oil export, neglecting the non-oil export or on non-oil export alone excluding the oil export. They failed to ascertain its effect on both the oil and non-oil (like agricultural and manufacturing) sectors export. Analyzing only oil exports or non-oil exports exclusively may not really give a value judgment and conclusion on the effect of exchange rate fluctuations and export performances in Nigeria. Furthermore, the study will provide deep insight into the relationship existing between exchange rate fluctuations and exports by adopting a popular econometric methodology for a measure of fluctuations which is Generalized Autoregressive Conditional Heteroscedasticity (GARCH) modeling technique, which was not used by some of the previous studies.

In view of the above problem, the following research questions are raised:

1. How does oil export respond to exchange rate fluctuation?
2. How does manufacturing export respond to exchange rate fluctuation?
3. How does agricultural export respond to exchange rate fluctuation?

1.2 OBJECTIVES OF THE STUDY

The broad objective of the study is to determine impact of exchange rate fluctuations on export performance in Nigeria. Specifically, the study addresses the following objectives:

1. To trace how oil export respond to exchange rate fluctuation.
2. To trace how manufacturing export respond to exchange rate fluctuations.
3. To trace how agricultural export respond to exchange rate fluctuation.

1.3 SIGNIFICANCE OF THE STUDY

This research will serve as a future guide to the policy makers in the formulation of better and efficient policy options for managing exchange rate fluctuations in Nigeria. Also, the research will be of immense help to the general economy, as it will provide possible measures the monetary authority could adopt in order to maintain exchange rate stability so that exchange rate can influence importantly export growth, consumption, resource allocation, employment and private and foreign investments as research has shown. Above all, it will add to the existing literature thus, providing relevant information that could guide further researchers on this subject.

1.4 SCOPE OR DELIMITATION OF THE STUDY

This study intends to look at the export performances and exchange rate fluctuations in Nigeria. Thus, it is restricted to tracing the responses of some export components to shock to the exchange rate over some periods; hence it omitted the test of hypothesis. The study covers a period of 51 years that is 1961-2011. This range is chosen to give room for enough degree of freedom that will ensure reliable estimates.

CHAPTER TWO

2.0 EXCHANGE RATE FLUCTUATION IN THE CONTEXT OF NIGERIAN ECONOMY

2.1 INTRODUCTION

The exchange rate arrangements in Nigeria have undergone significant changes over the past four decades. It shifted from a fixed regime in the 1960s to a pegged arrangement between the 1970s and mid1980s, and finally, to the various types of the floating regime since 1986, following the adoption of the Structural Adjustment Program (SAP). A regime of managed float, without any strong commitment to any particular parity, has been the predominant characteristic of the floating regime in Nigeria since1986 (Sanusi: 2004).

2.2 NIGERIA'S FOREIGN EXCHANGE REGIMES AND ITS VOLATILITY (1961-2011)

Nigeria's foreign exchange rate was fairly stable from 1980 to1985: at #0.5464, #0.61, #0.6729, #0.72, #0.76, and #0.89 to a US $ in 1980, 1981, 1982, 1983, 1984 and 1985 respectively. The introduction of the structural adjustment in 1986 depreciated to naira exchange rate to

#2.02, #4.01, #4.5, #7.39, #8.03, #9.9, #17.298, #22.3 and #21.88 to a US $ in 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993 and 1994 respectively. In 1995, the Central Bank of Nigeria (CBN) interviewed six times in the Autonomous Foreign Exchange Market (AFEM), meeting inn full the US $1.748 billion demanded by this market. The inability of some end-users to effectively back their foreign exchange demand with naira deposit at the CBN, led to the allocation of the US $1.748 billion. This action stabilized both the Autonomous Foreign Exchange Market and the Parallel Market Rates; converging and stabilizing at US $1 to #82.3and US $1 to 83.7 respectively. The CBN (1995) attributed this to its “guided depreciation” policy adopted at the beginning of that year which allowed it to intervene periodically at the AFEM at marketed- determined rates.

In 1996, the CBN maintained dual exchange rate with the official rate at #22/US $ and the AFEM rate averaging #82.5/US $1. The CBN intervention policy of 1995 was retained in 1996 to further stabilize the naira exchange.to enhance the naira rate stability, the CBN continued the suspension of the use of bills of collection and open accounts for import financing: the requirement that all imports into the country be accompanied by duly completed form as well import dully reports (IDRS).

In 1997, the dual exchange rate system was retained with the official exchange rate at #21.997/ US $1; while the AFEM rate was #85/ US $1. The naira exchange was #84.4/ US $1 and #88.1/ US $1 in the AFEM and parallel markets respectively in 1998.

In 1999, the foreign exchange management in Nigeria transited from the autonomous foreign exchange market to the inter-bank foreign exchange market (IFEM). During the year, the CBN intervened in the foreign exchange market 43 times against 51 times in 1998. IFEM rate in the year averaged #92.3/ US $1; while the bureau-de-change rate (BDC) averaged #92.26/ US $1, reducing the parallel market premium to 3.2%.

The exchange rate of the naira depreciated in all segments of the foreign exchange market in 2000. At the IFEM, the naira depreciated on the average by 6.5% to #101.65/ US $1. The rate was relatively stable during the first nine months of the year, but depreciated thereafter against US $. A higher level of depreciation was experienced in the parallel market falling by 10.7%.

In 2001, the naira depreciated in both the IFEM and the BDC. At the IFEM, the naira exchanged at #111.96/US $1. A sharp initial depreciation of the naira was experienced at the IFEM in January 2001, stabilizing in the remaining part of the year. A steeper depreciation of the naira was experienced in the BDC market with an appropriate decline of 10.32% to #132.57. The CBN (2001) attributed this decline to increase in demand for foreign exchange at $14.7billion and inflows reducing to US $15.7 billion; caused by increased funding of the IFEM, external debt service payments and fall in oil receipts. Exchange rates at the IFEM and BDCs in 2002 were #121/US $1 and #137.57/US $1 respectively.

The naira maintained a stable exchange rate during the first half of 2003; disrupted in the fourth quarter by market exuberance and speculative activities. Consequently, the naira exchange rate depreciated by 6.5% at the Dutch auction system (DAS) - introduced to replace IFEM, resulting in the average exchange rate of #129.36/US $1. In the parallel market, the naira depreciated from #137.79/US $1 to #141.99/US $1. The premium between the DAS rate and the parallel rate declined from 14.8% in 2002 to 9.8% in 2003.

The naira maintained a relatively stable exchange rate to the US $ in 2004 and 2005. The CBN (2005) attributed this to a combination of the non-accommodating monetary policy stance of the CBN, the prudent fiscal policy of the federal government, and increase in foreign exchange. As a result, end of the year exchange rate appreciated in nominal terms by 3.1% in the DAS market. Analyzing the exchange rate on an annual basis, the CBN confirmed a rate of depreciation of 3.1% compared to 6.6% in 2003, having traded on the average at #133.5/US$1. At the BDC, the naira appreciated by 0.8% to 140.9/US$1, narrowing the premium between DAS and BDC rates to 5.5% from 9.8% in 2003.

2.3 FOREIGN EXCHANGE RATE VOLATILITY, EXPORT PERFORMANCE AND ECONOMIC GROWTH

Fluctuations, positive or negative are not desirable to producers of export products as it has been found to increase risk and uncertainty international transactions which according to Adubi and Okunmadewa (1999) discourage trade. Findings by the international monetary fund (1984) reveal that these fluctuations induce undesirable macro-economic phenomena. Inflation, through caballero and Carba (1989) observed positive effect of exchange rate fluctuations on export trade in European Union Countries. Viewing the effect of these fluctuations first from the impact on foreign direct investments, Walsh and Yu (2010) noted that low exchange rates favor the importation of productions machinery, and production and exports in periods of high foreign exchange rate. In addition, Foot and Stein (1991) found a strong evidence of a weak host country currency increase inward foreign direct investment within an imperfect capital market models depreciation (down change in exchange rate) makes a host country less expensive than export destination countries. Making a firm-specific-asset analysis argument, Blonigen (1997) argued that exchange rate depreciation in host countries tend to increase foreign direct investment inflows; adding that a strong real exchange rate strengthens the incentives of foreign companies to produce at home for export instead of investing in a host country for export.

To Lawa and Meding (2010), different open economies experience different episodes of exchange rate appreciation in response to different types of stocks, contending that an appreciation in exchange rate induces a contraction of the exporting manufacturing sector. Maintenance of export performance to them require the depreciation of the real exchange rate of a country's currency, through monetary injections;

noting that a policy of exchange rate depreciation can successfully prevent a contraction of export output, having an allocative effect in the economy.

Adubi and Okunmadewa (1999) posited that Nigeria, a developing nation is expected to gain from export conversion price increase as a result of currency devaluation. Findings by Obadan (1994) and Osuntogun et al (1993) on the effect of stable exchange on export performance showed that exchange rate affect a country's performance; adding that instability in an exchange rate with its attendant risk affect export earnings, performance and growth: positive to exporters when devalued.

Poor results from the floating regimes of the 1970s necessitated a change in foreign exchange rate management. The structural adjustment project was introduced in 1986 with cardinal objective of restructuring the production base of the economy with a positive bias agricultural export production. The reform facilitated the continued devaluation of the Nigerian naira with the expected increase in domestic prices of agricultural export boasting domestic production. Empirical findings by

Oyejide (1986), Osuntogun (1993), and Ihimodu (1993) reveal changes in both structure and volume of Nigeria's trade as a result of the devaluation of naira.

To Srour (2006), diversification of countries export base is one reason given by developing nations for changing foreign exchange rates and regimes which in turn according to the World Trade Organization (2010) increases local production, employment, income and economic growth. Concluding, Chukwu (2007) and Adubi and Okunmadewa (1999) noted that foreign exchange rate is a determinant of export trade and economic growth in Nigeria.

In their study of Canada, Lawa and Medina (2010) observed a coincidence in exchange rate appreciation with a contraction of 3% in the country's gross domestic product in the manufacturing sector; with a 2% average decline in manufacturing GDP over a 20 years period characterized foreign exchange rate appreciation.

Though carrying attendant risks, foreign exchange rate movement are monetary policy instruments to achieve export growth, economic growth and development of any nation.

2.4 NIGERIA'S EXPORT PERFORMANCE

Non-oil export performance was poor from 1980-1984. Nigeria's total non-oil export resulted in a net inflow of foreign exchange totaling #362.1 million (in naira value) in 1984. This contrasted with the net inflows of #244.8 million in 1983 and #1.398 billion in 1982. Export performance maintained a fairly stable growth rate of 19% to 1989, reducing sharply to 5% annual growth rate to #21.8765 billion in 1993; with a 5% decline in 1994. Nigeria's export trade is dominated by all exports accounting for 95%of her export value. Notwithstanding, improvements have been recorded in the non-oil exports. From non-oil export value of #23,091.1 in 1995, contributions from this sector of the economy increased to #95.09 billion (unadjusted) at the end of 2003.

Export items from Nigeria, as in the world over, are measured using the Standard International Trade Classification (STTC) of the quantities and values of goods moved out of the country. It classifies export goods into 10 main groupings with codes 0-9. These are: 0- food and live animals; 1- beverage and tobacco; 2- crude materials, inedible; 3- mineral fuel; 4- animal and vegetable oil; 5- chemical; 6- manufactured goods; 7-machinery and transport equipment; 8-miscellaneous manufactured articles and; 9-miscellaneous transactions unclassified.

Nigeria according to the Central Bank of Nigeria (2005) has recorded consistently surplus in its trade balance. However, this has fluctuated widely along with petroleum export earnings. The balance in services and income on the other hand, has consistently been in deficit reflecting Nigeria's position as a net importer of services. The current account deficit was reduced from US $5.1 billion in 2002 to US $1.6 billion in 2003.

Exports are pivotal to Nigeria's development prospects, as they have been a major driver of economic growth, employment, and government revenue and carry potential for poverty reduction. Since 1999, merchandise exports have accounted for between 34% and 52% of GDP; its share was 47.6% in 2003. Nigeria's exports are dominated by crude oil and natural gas. Together, these two commodities have accounted for between 95% and 99% of total merchandise exports (WTO 2005), thus rendering export performance heavily susceptible to the vagaries of the international oil market. In 2003, Nigeria was the third largest oil exporter amongst the members of the Organization of the Petroleum Exporting Countries (OPEC), and the fifth largest in the world (OPEC 2004; quoted by WTO 2005). Her oil earnings increased from US $ 17.7 billion in 2002 to US $27.7 billion in 2003 on account of the increase in its OPEC quota and in international oil market prices.

Exports of natural gas rose significantly from US$ 27million in 1999 to US$ 1.7 billion in 2003, contributing to the diversification of Nigerian exports. This could be attributable to Nigerian government effort to reduce the level if gas flaring associated with oil production, as well as measures to encourage the exploration of Nigeria's huge natural gas resource, largely untapped until recently.

Non-oil exports, although relatively small contributive to export diversification and serve as a channel for poverty reduction. Non petroleum exports comprise agricultural products such as palm nuts and kernels, sesame seeds, cocoa beans; and some manufactured products including chemicals, corrugated asbestos sheets, machineries and transport equipment. The growth in this export category is inhibited by uncertainties in world commodity prices, unstable domestic macro-economic environment, supply side constraint (high cost of finance and infrastructural facilities) and other factors affecting the competiveness of her exports. In the face of these impediments, the value of exports of products in this category increased from US$21.1 million in 1999 to US$735.1 million in 2003; maintaining a 10% annual growth rate to 2005.

These exports are distributed across a large number of countries; both most were to industrialized countries. In 2003, 72% of merchandise exports were to industrialized countries of which the United States accounted for 40% (mostly under the African growth and opportunity act). Exports to the European Union improved largely due to Cotonou agreement. Exports to African and Asian countries accounted for 10% and 11%of total merchandise export respectively.

Export in services has been insignificant. These performances have not met the export policy exportations of the Nigerian government. Production for exports and local consumptions stood at 45%of production capacity in 2005, compared to 53.0% in the NEEDS document. Non-oil income in 2005 stood at #95.092 billion compared to #19.492 billion in 1999. Export growth rate was 7.51% compared to the target of

10%. Growth in non-oil earnings target was 5.0% and actual was 3.2% for 2003; 5% target for 2004 and actual was 3.6%. Utilization under AGOA scheme was only 40%, falling short of the 100% target; a clear proof of under-utilization of favorable export policy.

Countries at comparable levels of economic development with similar exports policy targets, for example the Central African Republic and Brazil, performed expectedly in response to export drive policies initiated locally and through trade agreements. Brazil recorded 26% annual growth rate in export in her agriculture business sector between 2000 and 2005 surpassing the target of 20%; while exports to developed countries grew at annual rate of 13%, also surpassing the target of 10%. The country currently ranks first among world exporters of sugar, ethanol, beef, chicken, pork, coffee, soya, orange juice and cotton (veiga; 2008).export performance of the Central African Republic showed an increase in export value from US$87 million in 1997 to US$118.7 million in 2005, a 36.4%increase (WTO 2007).

2.5 LITERATURE REVIEW

2.5.1 THEORITICAL LITERATURE

Since the adoption of floating exchange rate in the developing countries in 1973, the questions of whether exchange rate changes uncertainty have independent adverse effects on exports and trade has attracted a lot of attention in the literature. The introduction of Structural Adjustment Program by many of these countries and the attendant liberalization of exchange rates has brought the discussion of these issues further into global focus. A review of the literature shows that the issue is far from being settled, though not all studies are fully comparable.

There are two major trends in the literature. The first argues that exchange rate fluctuations will impose cost on risk-averse market participants who will generally respond by favoring domestic to foreign trade at the margin. Early study of these issue focused on firms behavior and presumed that increased exchange rate fluctuations would increase the uncertainty of profits on contracts denominated in a foreign currency and would therefore reduce international trade to levels lower than would otherwise exist if uncertainties were removed. This uncertainty of profits or risks would lead to risk-averse and risk-neutral agents to redirect their activity from higher risk foreign markets to the lower risk home market.

Clark (1973) study in many ways lays the theoretical ground work for the traditional school by examine bilateral trade, and the behavior of risk-adverse firms. Numerous restrictions are imposed, including firms that only produce goods for export, limited hedging possibilities, contracts denominated in foreign currencies, no imported factors inputs and a perfectly competitive market place. He supposes that as the variance of exchange rate uncertainty increases, so does the uncertainty of profitability where profits are expressed in the home currency. Utility is given as a quadratic function of profits ($\upsilon(\pi) = \alpha\pi + b\pi^2$), where b as a risk aversion parameter, is less than zero. As uncertainty increases, Clark contends that a risk averse firm will reduce the supply of goods to the level where marginal revenue actually exceeds marginal cost in order compensate for the additional risk, thereby maximizing utility.

The argument views traders as bearing uncertified exchange risk, if hedging is impossible or costly and traders are risk-adverse or even risk neutral, risk-adjusted expected profits from trade will fall when exchange risk increase (chowdhury: 1993).

Also Qian Varangis (1992) assert that exchange rate fluctuations increase the risk and uncertainty in international transactions and thus discourage trade, if traders are risk adverse, they will be willing to incur an added cost to avoid the risk associated with the exchange rate fluctuations. Thus, a firm's export supply (import demand) curve will shift to the left (right) in the presence of exchange rate fluctuations, for any quantity of exports or imports, the corresponding price will be higher under exchange rate fluctuations or risk than without it.

Empirical traditional school examination of fluctuations and bilateral trade is that of Hooper and Kohilhagen (1978). They derive demand and supply schedules for individuals firms, where the explanatory variables include the currency denomination of contracts, the degree of firms risk aversion and the percentage of risk hedged in the forward market. Perhaps the most significant contribution of this study is how it allows nominal exchange rate volatility to only impact the amount of risk that remains unhedged. Their study involved a number of a prior assumption, including the importers that sell of their products abroad in a monopolistic market framework. They found that increased exchange rate fluctuations lead to both downward-shifting supply and demand curves, where quantities and prices decline when importers face the exchange rate risk (depending on demand elasticity and their degree of risk-aversion), and quantities decline and prices increase when exporters (suppliers) bear the risk.

Other studies in supports of this idea include; chusman (1983, 1988), Kenen and Rodrik (1986), Kroner and Lastapes (1991), Thursby and Thursby (1987), Akhtar and Hilton (1984), and Isitua and Neville (2006). In other words, their studies indicate a significant depressive effect of exchange risk on international trade.

Some studies such as caballero and Corbo (1989), Kumar and dhawan (1991), concluded that due to the political economy, effects of exchanges rate fluctuations its increase was responsible for the slowdown in trade in the 1970s. In essence the flexible exchange rate led to misalignments of major currencies, which led, in turn to adjustment problems in the tradable goods sectors and political pressures toward protectionism.

CÔté, (1994), in her comprehensive review of the literature pointed out that the traditional school (theories that exchange rate, fluctuations affect is negatively) has examined not only the presence of risk, but also its degree, which in turn depends upon such factors as whether production inputs are imported, the opportunity to hedge risk and the currency in which contract are denominated.

One of the main objections to the traditional school is that it does not properly model how firms manage risk, not only though the use of derivatives, but also as an opportunity to increase profitability. For this reason the use of derivatives, but also as an opportunity to increase profitability. For this reason the argument turns to the risk – portfolio school. What is referred to here as the risk- portfolio school is not a unified body of thought, but is comprised rather of multiple theories, varying in complexity, but united in the opinion of the traditional school as unrealistic.

This second strand of the literature argues that traders benefit from exchanges rate fluctuation or risk. According to these studies, trade can be considered as an option held by firms – like any other option such as stocks, the option value of trade can rise with fluctuation bredin (2003)

De Grauwe (1988), in a straight forward attack on the tomer school, convincingly argues that due to the convexity of the profit function, exporters return from favorable exchange rate movements and the accompanying increased output outstrip the decreased profits associated with adverse exchange rates and decreased output, and therefore "As a result, risk – neutral individual will be attracted by these higher profit opportunities". Although the convexity of the profit function may imply a positive correlation between trade and exchange rate risk, the move prominent tenet of the risk – portfolio school examines exchange rate risk in light of modern portfolio diversification theory.

As summarized by Farrell, Victoria S., Dean A. DeRosa and Ashby M. T., (1983), economic agents maximize profitability by diversifying the risk levels in their investment portfolios by simultaneously engaging in low, medium and high-risk activity with corresponding potential rates lighter risk would then not discourage risk- neutral agents from engaging in trade, but would present on opportunity for diversity their risk portfolios and increase the likelihood of profitability.

Franke (1991), argues that if exporters are sufficiently risk – aversely, an increase in exchange rate fluctuations may result in an increase in the expected marginal utility of export revenue which serves as incentive to exporters to increases their exports in orders to maximize their revenues.

Dellas and Zilberfarb (1993), examine trade decisions in the framework of a portfolio savings decision model under uncertainty. Their theoretical model assumes a small open economy with an individual domestic agent importing, exporting and consuming two products in two time periods, where asset markets are incomplete and the agent makes trade decisions with incomplete knowledge of price risk. Their study examines the effects of uncertainty both in the absence of a forward market and with complete and incomplete lodging opportunities.

Without a forward exchange market, the individual maximizes utility by choosing a quantity of exports x such that:

q = eu (y-x1 PX)

Where y-x is the consumption of the exportable good and p is the real exchange rate, unite first order condition: E (-U, +PUZ) = 0

The effect of increased exchange rate fluctuation on trade depends on whether the function g = uz p-41, is concave or convex, which in tum is determined by a degree of risk – aversion I nth utility function. With a forward exchange market, the domestic agent maximizes utility, Eu (c1, c2), subject to the constraints.

C1= Y1-X1-X2

C2 = p1 X1 +P2 X2

With two products and incomplete forward market opportunities (X1 representing and exportable good subject to risk and x2 completely hedged), they find the effects of fluctuations on trade are ambiguous depending on the risk parameter a. With complete hedging possible and costless, individuals can mutilate them from exchange rate risk and increased fluctuations do not depress trade levels. They then extend these findings to producer selling to both domestic and foreign markets and find results consistent with those for the individual domestic agent.

Broll and Eckwert (1999) theoretical model demonstrates how higher exchange rate fluctuations increases the potential gains from trade. Their study uses an international firm that sells its product either entirely at home or abroad, and must also determine which market to choose with incomplete knowledge of exchange rate fluctuations. Their theoretical construct results in a quveclly positive relationship between the varicince of the foreign sport exchange rate and the volume of output and total export.

2.6 ALTERNATIVES

De Grauwe suggests a third, political- economic, theory. This approach proposes that nations that have flexible exchange rate systems and experience exchange rate misalignments are susceptible to lobbying from failing industries to create or increase e protection from trade. As a result, greater exchange rate fluctuations would decrease trade flows as a result of protectionist legislation or executive order critics of this approach, such as Cote, point out that:

An industry's vulnerability due to adverse exchange rates often reflect deeper competitiveness issues and;

Flexible rates help absorb the output and unemployment costs of misalignments.

These counter arguments speak more to the welfare effects of De Grauwe theory than to its validity. It is not difficult to produce modern examples of US. Industries, even those industries suffering from non-exchange rate induced competitiveness problems e.g. steel, that have successfully lobbied the federal government to increase tariffs on imports whose prices were argued to be artificially low. That firm successfully hobby governments to restrict imports (trade) are evident. A more salient problem with De Grauwe political – economic theory is how to quantify the degree of misalignment and the resulting effects of exchange rate induced lobbying on trade flows.

Other supporters of this argument include: IMF (1984) chambers and just (1991), and Klein (1990) their studies indicate that exchange rate fluctuations catalyzes trade flows.

Cote likened this approach to derivative markets, where trade is viewed as an option that because more valuable as the exchange rate becomes more volatile.

Abel (1983) showed that if one assumes perfect competition, convex and symmetric costs of adjusting capital, and risk neutrality, investment is a direct function of price (exchange) uncertainty.

Other found no evidence to suggest that exchange rate fluctuations has any significant impact on trade e.g. Aristotelian (2001). Given today's well- developed financial markets, one may argue that traders (at least to some extent) should be able to reduce or hedge uncertainty associated with exchange rate relativity. The relationship between exchange rate volatility and trade may than be weak, if not completely absent.

McKenzie (1999) gave a thorough review of the literature and discussed several empirical issues of exchange rate fluctuations on export. These fluctuation measures to use, which sample period to consider, which countries to study, which data frequency and aggregation level to employ and which estimation method to apply in each specific study at hand. As pointed out by him, each of these issues and how they are handled may be part of the explanations for the inconclusive findings in the literature.

2.7 CONCEPTUAL ISSUES IN EXCHANGE RATE FLUCTUATIONS

Risk in international commodity trade usually emanates from two main sources: changes in world prices or fluctuations in exchange rates. These may affect export by increasing the uncertainties of export ore effecting a change in the cost of transaction, processing, etc. The state of the two major sources determines the eventual domestic trade price of a commodity over a period of time. In other words, a decision to produce for exports involves uncertainties about the prices in the foreign exchange that such sales will realize, as well as the exchange rate at which foreign exchange receipts can be converted into domestic currency. In a period of fixed exchange rates, the major source of concern in international trade for developing countries is the fluctuation that may arise from the word price of piracy commodities, which constitute the bulk of exports of these countries (Adubi, A. A. and Okunmadewa, F.: 1999). With the increasing embrace of the structural adjustment programs that have devaluation of currency or market determination of exchange rate and all prices as the fulcrum, the attention has shifted to the fortunes of the currencies at the foreign exchange market. Given the erratic pattern of the exchange rate in must developing countries as a result of devaluation, there has been increasing concern about the possible effect of exchange rate fluctuation on trade. In other word, for international traders with a given price, the major source of uncertainty is the exchange rate at which they can translate their sales revenue in foreign currency into local currency.

2.8 EMPIRICAL LITERATURE

Since theory has been unable to provide a definite answer as to whether the trade enhancing effects of portfolio diversification outweigh the costs to risk- averse economic agents as exchange rate fluctuation increase, a deal of recent research has been devoted to empirical analysis of this issue. However, the empirical evidence on this point is still lucondusive. The studies by Cushman (1983, 1988), Thursby and Thursby (1987), Kenen and Rodrik (1986), caballero and Corbo (1989), Akhtar and Hilton (1984) and De Grauwe (1988) found statistically significant evidence that exchange rate fluctuations does impede trade. Contract the results from studies by IMF (1984), Kroner and lastrapes (1991), Hooper and Kohilhagen (1978), Bailey and Taulas (1988) could not find conclusive evidence that exchange rate fluctuations have had statistically significant deterrent effects on trade. Even in the latter group of studies, the results are inconsistent across countries; results from Kroner and Lastrapes (1991) elucidate that for some countries, exchange rate fluctuations have a negative effect on trade but for others it does not.

Maskus (1986), however, provided a link between his study and previous works by comparing the effects of exchange rate risk across major sectors of an economy. Example, manufactured goods, agriculture, chemicals and others. He found that aggregate bilateral agricultural trade (the United States and its major western trading partners) is particularly sensitive to exchange rate uncertainty. Maskus argued that agriculture, compared with manufactured goods trade, is more responsive to exchange rate changes because (a) agricultural trade is relatively open to international trade (where openness is measured by the ratio of exports and imports to domestic agricultural output), and (b) agriculture exhibits a low level of industry concentration.

Arize, A. C., Osang T., and Slottje D. J. (2000) provided evidence that increased exchange rate fluctuations has an adverse effect on trade due to rate – adverse traders. That is, higher exchange rate fluctuations leads to higher costs for risk – averse traders and thus to less volume of export.

Baron (1976) study, also looks at bilateral trade, but focuses on how the choice of invoicing currency affects an exporting firm production and pricing decisions when exchange rates are volatile and the market place is not perfectly competitive. He shows that exporting firms face greater price risk when the have currency is used. In response, as exchange rate uncertainty increase, risk – averse, profit – maximizing firms will increase prices when the foreign currency is used to invoice goods. Baron argues that the way in which a firm maximizes utility (minimizes risk) when the home currency is used for invoicing depends on the shape of the demand curve it faces e.g. reducing prices when demand is linear, thereby increasing demand and decreasing profit variance (uncertainty).

Philippe, (2006), in their studies of exchange rate fluctuation and productivity growth: the role of financial development offer empirical evidence that real exchange rate volatility can have a significant impact on long term rate of productivity growth, but the effect depends critically on a country's level of financial development, thus, countries with relatively low levels of financial development. This, countries with relatively low levels of financial development, exchange rate fluctuations generally reduce growth, whereas for financially advanced countries, there is no significant effect.

In Nigeria, Ajaji (1988) and osagie (1985) using the structuralize approach in their study of external trade flows opposed the adoption of a more flexible exchange rate policy in Nigeria. Their arguments were based on the fact that exchange rate devaluation would be stag fluxionary and have no significant effect of net external trade balance in the less developed countries because of the low price elasticity generally.

The findings of Ajayi (1988) and Osagie (1985) support an earlier study by Ojo (1978) who suggested that exchange rate changes heed not play any significant role in the explanation of Nigerian import-export balance.

Adubi, A. A. and Okunmadewa, F. (1999), in their studies of price, exchange rate volatility and Nigeria's agricultural trade flows empirically analyze that if the exchange rate change is more volatile, it tends to increase the prices of export crops, but the general effect leads to a decline in export production. Then for import trade, the appreciation of the exchange rate reduces imports, while its volatility has a positive effect. If the exchange rate and import prices are volatile, they tend to increase the level of imports. Their study also show that the SAP era, though beneficial in terms of price increases of agricultural exports, has also resulted in a high level of price and exchange rate fluctuations.

Another study that is relevant to this research is Osuntogun, (1993). In their analysis of strategic issues in promoting Nigeria's non-oil exports, they determined the effects of exchange rate uncertainly on Nigeria's non-oil export performance as a side analysis. Their work is indeed a pioneering effort in Nigeria to determine the effect of exchange rate risk or fluctuations on trade. However, estimates of the exchange rate risk obtained in their work are not standard.

Also, another study significant to this research is Isitua and Neville (2006). In their work, assessment of the effect of exchange rate volatility on macro-economic performance in Nigeria, the key result emanating from their study is that exchange rate fluctuations has a negative and significant effect on Nigeria's exports using a standard measure of exchange rate volatility though their research concentrated only on all exports.

The most notable variations of this methodology are by Koray and lastrapes (1989), who used the vector autoregressive (VAR) model, and Kroner and lastrapes (1991), who used the generalized autoregressive conditional Heteroscedasticity (GARCH) in mean model. There are three issues regarding the model. The first is how to measure exchange rate fluctuations or volatility, the second is which measure of fluctuations, normal or real exchange rates, is prospered-- in modeling. The third issue is the effect of aggregate or bilateral trade data on the study.

Qian and Varangis (1992) dealt with the issue in their work and after carefully examination of the previous analytical frame works on exchange rate fluctuations and the factors discussed above, they concluded that there should be no imposed beliefs as to whether exchange rate fluctuations affect export values positively or negatively, thus the model to be used has to be general and flexible in its specification to take into account all the dynamics in the data generation process of the exchange rate and international trade value variables. The data on exchanges rate should be in normal terms and either multilateral or bilateral trade data could be used in order to investigate differences in the magnitude of the exchange rate fluctuations effects on trade.

The current research, apart from introducing dynamism into the study, will also employ a standard measure of exchange rate fluctuations that has been refined in the literature, which is GARCH modeling technique specifically exponential GARCH (i-e, e-GARCH). The choice of exponential GARCH is because it given a sealing property which is in a fairly good agreement with that of real data than its counterparts.

2.9 THEORETICAL FRAMEWORK

2.9.1 POLICY IN THE MUNDELL-FLEMING MODEL

The model developed to extend the analysis of aggregate demand to include international trade and finance is the Mundell-fleming model, which is an open economy version of the Is-lm model one lesson from the Mundell-fleming model is that the behavior of an economy depends on the exchange rate system it has adopted the effect of almost any economy policy on a small open economy depends on whether the exchange rate is floating or fixed.

The Mundell-fleming model shows that the power of monetary and fiscal policy to influence aggregate income depends on the exchange rate is allowed to fluctuate in response to changing economic conditions, thus only monetary policy can affect income. The usual expansionary impact of fiscal policy is offset by a rise in the value of currency. Under a system of fixed exchange rates, a central bank stands ready to buy or sell domestic currency for foreign currencies at a predetermined price. For example suppose that the Federal announced that it was going to fix the exchange rate at 120 naira per dollar. It would then stand ready to give

$1 in exchange for 120 naira or to give 120 naira in exchange for $1. In other words the essence of a fixed –exchange rate system is the commitment of the central bank to allow the money supply to adjust to whatever level will ensure that the equilibrium exchange rate equals the announced exchange rate therefore, under fixed exchange rates, only fiscal policy can affect income. The normal potency of monetary policy is lost because the money supply is dedicated to maintaining the exchange rate at the announced level (Mankiw, 2003)

Now to examine the international flows of capital and of goods and services, we extend the analysis by considering the prices that apply to those transactions. The exchange rate between two countries is the price at which residents of those countries trade with each other.

2.10 THE REAL EXCHANGE RATE AND TRADE BALANCE

What macro-economic influence does that real exchange rate exert? To answer this question, remember that the real exchange rate is nothing more than a relative price. Just as the relative price of hamburgers and pizza determines which one to choose for lunch, the relative price of domestic and foreign goods affects the demand for these goods-suppose first that the real exchange rate is low. In this case, because domestic goods are relatively cheap, domestic resident will want to purchase few imported goods; they will buy local rice rather than foreign one, local drinks rather than foreign ones, and vacation at home rather than abroad. For the same reason, foreigners will want to buy many of our goods. As a result of both of these actions, the quantity of our net exports demanded will be high. The opposite occur if the real exchange rate is high, because domestic goods are expensive relative to foreign goods, domestic residents will want to buy few of our goods. Therefore, the quantity of our net exports demanded will be low. This relationship between the real exchange rate and net exports can be written as:

$$NX = NX(e).$$

This equation states that net exports are a function of the real exchange rate.

2.11 DETERMINANTS OF THE REAL EXCHANGE RATE

Having all the pieces needed to construct a model that explains what factors determine the real exchange rate, we now combine the relationship between net exports and the real exchange rate with the model of the trade balance, and the analysis can be summarized as follows:

The real exchange rate is related to net exports. When the real exchange rate is lower, domestic goods are less expensive relative to foreign goods, and net exports are greater.

The trade balance (net exports) must equal the net capital outflow, which in turn equals saving minus investment savings is fixed by the consumption function and fiscal policy investment is fixed by the investment function and the world interest rate (Mankiw 2003).

2.12 LIMITATIONS OF THE PREVIOUS STUDIES

Some previous studies did not take into account the possibility of non-stationary, in the variables used, yet it is often said that asset prices such as stock prices or exchanging rate follow a random walk. That is, they are non-stationary (Gujarati, 2005). A time series is used to be stationery if its mean, variance and auto-covariance (at various lags) remain the same no matter at what point they are measured, (i.e., they are time variation) while a non-stationary time series may be of little practical value.

Some reviewed empirical studies econometrically are incapable of portraying the dynamic adjustment process to the disequilibrium. Moreover, in their estimations, the likely long-run relationships existing between trade flows and exchange rate fluctuations on exports and imports variability were ignored. Hence the goal of this study is to address these neglected issues by first conducting a unit root test using Augmented Dickey fuller test to ensure the stationary of the variables second, a co-integration analysis to determine whether there is a long-run equilibrium relationship between trade flows and exchange rate fluctuations and finally, a vector error correction model to know whether the disequilibrium in trade could be corrected back to its equilibrium position.

Moreover, this study will adopt a more popular econometric methodology for a measure of exchange rate fluctuations, which is GARCH modeling technique, which was not used by some of the previous studies. For instance, the study by Osuntogun, (1993) which indeed is a pioneering effort to this study used a measure of exchange rate risk postulated by caballero and Corbo (1989), which as pointed out by pick (1990) is faulty, thus the estimate of the exchange rate risk obtained were not standard. That is, according to pick, such measure over-exaggerates the risk. And research has also shown that the analytical framework and the testing procedure used to measure the nature and effect of exchange rate fluctuations on trade volume determine the outcome thereof.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

The chapter discusses the analytical frame work data transformation, model specification, sources of data, and estimation procedure used for this research work.

3.1 ANALYTICAL FRAMEWORK OF THE MODELS USED

Multiple regression analysis used vector autoregressive (VAR) model will be the statistical framework for the research work. The choice of VAR model is based on the fact that it allows for joint estimation of relationships between exchange rate fluctuations and trade flows, as well as how past information relates to received fluctuations. Also, it assumes that the information relevant to the production of the respective variables is contained solely in the time series data of these variables and the disturbances uncorrected. More so, variance decomposition as an aspect of VAR is one of the most popular techniques for capturing the impulse response and transmission of shocks among the Variables.

Furthermore, the GARCH model is considered suitable to measure fluctuations because it will provide a rich class of possible parameterizations of Heteroscedasticity. Also, GARCH model is more parsimonious, and avoids over-fitting. More so, according to Qian and Varangis (1992), the advantages of this approach over other approaches are, first, the risk from exchange rate fluctuations is explicitly modeled and included as a regression in the trade value equation, thus, avoiding arbitrariness in defining the measure of fluctuation risk. Second, possible Heteroscedasticity will be taken into full account in the estimation process, hence avoiding the possibility of biased estimates of the test statistics. The estimation of fluctuations or volatility using the GARCH modeling technique a used by kroner and lastrapes (19910 will follow the process: first, we will obtain the residuals from the AR equation of the real exchange rate. Second, obtained, estimate the AR equation of the squared residuals to get a measure of fluctuations (Gujarati 2005).

The quarterly series exchange rates and other variables will be obtained from the CBN statistical bulletin and national bureau of statistics (NBS). Trade flows are taken to cover both the oil and non-oil exports and imports. Hence, trade flows are assumed to be influenced by exchange rate and domestic GDP. In other words, they are conventionally treated as determinants of exports and imports supply, while the exchange rate fluctuations will be estimated and incorporated into the equation as an independent variable.

3.2 DATA TRANSFORMATION

Considering the following model:

$Xt \quad = \lambda_o + \lambda_1 k_t + \lambda_2 \gamma_t + \lambda_2 w_t + U_t$------------------------- (1)

Where

Xt = Export flows (oil & non-oil exports) at time t

Kt =bilateral real exchange rate at time t

YT = Domestic income at time t

Wt. = Exchange rate fluctuations at time t

Therefore, since equation I holds true at every time period, it equally holds in the previous periods in the past, (t -), (t – 2), etc. thus, equation 1 can be written as:

$Xt\text{-}_i \quad = = \lambda_o + \lambda_1 k_t - i + \lambda_2 \gamma_{t-i} + \lambda_2 w_{t-i} + U_t - i$ ------------------- (2)

Where,

X_{t-i}, k_{t-i}, Yt_{-i}, $w_{t.-i}$ and U_{t-i} represent unknown values of x, k, y, w and u respectively to the estimated.

Now subtracting equation 2 from equation 1, we obtained

$\Delta Xt \quad = \lambda_1 \Delta k_t + \lambda_2 \Delta \gamma_t + \lambda_2 \Delta w_{t.} + \Delta U_t$ ------------------- (3)

Where,

Δ = First – difference operator (telling us to take successive differences of the variables in question. Hence, $\Delta x_t = (x_t - x_{t-1})$, $\Delta k_t = (k_t - k_{t-1} = \Delta \gamma_t = (\gamma_t - \gamma_{t-1})$, $\Delta w_t = (w_t - w_{t-1})$, $\Delta U_t = (U_t - U_{t-1})$.

Now for empirical purposes, we transform equ (3) into.

$\Delta Xt = \lambda_1 \Delta k_t + \lambda_2 \Delta \gamma_t + \lambda_3 \Delta w \gamma_{t+}$--------------------------------- (4)

Therefore, equation 2 is known as the level from while equation 3 is known as the first difference form. Both forms are often used in empirical analysis. But instead of studying the relationships between the variables in the level form, we will be interested in their relationships in the growth forms, which is the first –difference form. Thus, in equation 3,

Δx_t Δk, Δy, and Δw represent changes in the Logs of trade flows, bilateral exchange rate, GDP and fluctuation respectively, where a change in the variable is a relative or percentage change (if multip0lied by 100).

The model (that is, model in valuing lagged regressed). To justify for the assumption of no auto correction in equation 4, Durbin – Watson (Δ-w) d test will be used. The first – difference transformation is said to be appropriate if the Δ-w d is quite low. In the words of mandala, use the first – difference from whenever $d \propto R^2$. While the choice of optional $L \propto q$ length for the VAR specification will be determined using both the Akaike (AIC) and Schwarz (Sc) information criteria. Finally, to capture objectives 1, 2 and 3 aVAR model is specified.

3.3 MODEL SPECIFICATION

We shall obtain the conditional fluctuation values from the estimated variance equation of the ARCH model developed by Bollerslev (1986) and advanced by Nelson (1991). We therefore specify the following GARCH (p, q) model.

$X_t = q_o + \beta\gamma_t + U_1$ --------------------- (1)

In the Akaike mean equation, X_t = individual time series data of the variables of interest while Y_t is (k x 1) vector of explanatory variables and it includes also autoregressive terms of the dependent variables.

The initial condition is assumed to be:

$U \sim iid\ N(o, \delta^2_t)$ ------------------------- (2)

$$\delta^2_t = \alpha_o + \sum_{t=1}^{n} \lambda_l \delta^2_{t-1} + \sum_{t=1}^{n} \gamma_l U_{t-i} + \sum_{t=1}^{n} \beta_K \gamma_k \text{ ---------------(3)}$$

Equation 3 is the variance equation, which states that the value of the variance scaling parameter 6^2 depend on both it past values captures by lagged 6^2_t terms and on the lagged squared residuals terms. While y_t is a set of explanatory variables that might help to explain the variance equation.

Note, to guarantee that the forecasts/estimates of the conditional variances are non-negative; we modify the variance equation by adopting the exponential GARCH developed by Nelson (1991). He propounded the E – GARCH to solve the restriction problem of GARCH models i.e., problem of persistence of shocks to conditional variance).

Thus, the generalized E – GARCH (p, q) model for the conditional variance is:

$$\ln(\delta^2_t) = \alpha + \sum_{j=1}^{r} \lambda_l \ln(\delta^2_{t-1}) + \sum_{k=1}^{n} \beta_k \gamma_k + \sum_{j=1}^{9} \left[w \left| \frac{U_{t-j}}{\delta_{t-i}} \right| + \theta_j \frac{U_{t-j}}{\delta_{t-j}} \right] \quad \text{------}$$

Where,

a, Λ_i, β_k, w_i and θ_j are parameters to be estimated. Therefore the left hand side being in of the conditional variance, it implies that the leverage effect is exponential not quadratic, hence the estimates of the conditional variance are positive.

The equation for the overall objectives can be written as:

$$\text{Inxt} = \lambda_o + \lambda_1 \text{Ink}_t + \lambda_2 \text{In}\lambda_t + \lambda_3 \text{InW}_t + U_t$$

Where:

Xt= Trade flows (imports plus exports) at time t

Kt= Bilateral real exchange rate at time t

Yt= Domestic income at time t

Wt= Exchange rate fluctuations at time t

Theoretically, one would expect that the real exchange rate depreciation may lead to an increase in exports due to the relative price effect. In addition, increase in domestic income may result in a greater volume of exports. While the effect of exchange rate fluctuations on trade flows is yet inconclusive. In other word, it is expected that λ1 and λ2 > 0 while λ3 < or > 0. Now to capture objectives 1, 2 and 3, we shall estimate the reduce form n- variable VAR model of order model of order k as follows:

$Zt = p_0 + \ _{i=1}^{n} piZ_{t-l} + U_t$ ---------------------------- (5)

Where,

Z = vector of endogenous variables

P_t = parameters (λα, β and δ) to be estimated

The impulse responses and variance decompositions computed from the VAR estimates shall be used to ascertain the dynamic effects of shocks on the endogenous variables included in the model. The further analysis to variance decomposition is needed as it offers information on the relative importance or predictive content of each of the explanatory variables regarding the dependent variable.

We specify the model as follows:

$\text{In}\Delta\, x_t = \lambda_0 + \{\ {}^{n}_{r-1} = \lambda_l \Delta\, x_{t-i}\} + V_t$-------------- 5a

$\text{In}\Delta\, x_t = \lambda_0 + [\ {}^{n}_{r1=1} = \lambda_l \Delta\, x_{t-i}\ \} + \ {}^{n}_{1=1} = \alpha_l \Delta\, k_{t-i} + \ {}^{n}_{1=1}\, p_l \Delta\, y_{t-l}$

${}^{n}_{1=1}\, \delta_l \Delta\, w_{t-l}\,] + Y_{\text{i-t}}$---------------------------- 5b

$\text{In}\Delta\, k_t = \alpha_0 + [\ {}^{n}_{1=1} = \alpha_l \Delta\, k_{t-i} + \ {}^{n}_{1=1} = \beta_l \Delta \gamma_{t-i} + \ {}^{n}_{1=1}\, \delta_l \Delta\, w_{t-l}$

$+\ {}^{n}_{1=1}\, \lambda_l \Delta\, x_{t-l}\,] + v_{\text{2-t}}$---------------------------- 5c

$\text{In}\Delta \gamma_t = \beta_0 + [\ {}^{n}_{1=1} = \beta_l \Delta \gamma_{t-i} + \ {}^{n}_{1=1} = \delta_l \Delta\, w_{t-i} + \ {}^{n}_{1=1}\, \lambda_l \Delta\, x_{t-l}$

$+\ {}^{n}_{1=1}\, \alpha_l \Delta\, x_{t-l}\,] + v_{\text{3-t}}$---------------------------- 5d

$\text{In}\Delta\, w_t = \delta_0 + [\ {}^{n}_{1=1} = \delta_l \Delta\, w_{t-i} + \ {}^{n}_{1=1}\quad \lambda_l \Delta\, x_{t-i} + \ {}^{n}_{1=1}\, \alpha_l \Delta\, k_{t-l}$

$+\ {}^{n}_{1=1}\, \beta_l \Delta \gamma_{t-l}\,] + v_{\text{4-t}}$---------------------------- 5e

The level of variations in trade flows from each of the explanatory variables will determine how significant or not, shocks from such variable are to the Nigerian trade flows. For instance, if shock from the exchange rate fluctuations is statistically significant, it implies that exchange rate fluctuations are important determinant of variations in exports and imports in Nigeria.

To ascertain f there is a long –run relationship between trade flows and exchange rate fluctuations, the Engle Granger two-step approach to ECM would be adopted. In other words, incorporate the estimated resident from the co-integrating regression in the error correction model. The VAR model can be reformulated as vector error correction model (VECM) if there is evidence of co-integration using Johnson (1988) procedure as follows:

$$\Delta \text{Inx}_t = \lambda_0 + {}_{i-1+}^{n} \lambda 1 \Delta k_{t-i} + {}_{i-1}^{n} \lambda 2 \Delta y_{t-I} + {}_{i-1}^{n} \lambda 3 \Delta w_{t-I} + \lambda_4 \text{ECM}_{e-I} + V_i$$

Where,

ECM = (ΔInx_t - λ_0 - $\lambda_1 \Delta k_t$ - $\lambda_2 \Delta \gamma_t$ - $\lambda_3 \Delta W_t$) t_{-1} and is the Error correction model. It directly estimates the speed at which a dependent variable returns to equilibrium after estimating both the short term and long term effects of time series on another.

λ_4= Adjustment parameter, it shows how the disequilibrium in the dependent variable is being corrected each period. If statistically significant, it implies the equilibrium will be corrected at different period but if other wise, will be corrected at the same period.

$^{n}_{t-i} =$ Summation of the range of the variables with n as the maximum distributed lag length

= Difference operator.

3.4 SOURCES OF DATA AND VARIABLES USED

The dependent variable in the study is the Nigeria's trade flows (both oil and non-oil) to the United States for the period between 1980 and 2011, and is denoted as x.

Economic theory suggests that domestic income (GDP), donated as y and bilateral real exchange rate (RER) between Nigeria and its major trading partner (US), denoted ask are important determinants of a country's trade. The data for these variables will be obtained from the CBN statistically Bulletin (various issues) and National Bureau of statistics.

3.5 ESTIMATION TECHNIQUE

We shall adopt methods of two stages least squares (25LS) and maximum likelihood in our estimations. The use of two stages least squares is informed by the fact that we have endogenous repressor's on the right hand side of the multiple regression model.

CHAPTER FOUR

PRESENTATION AND INTERPRETATION OF RESEARCH FINDINGS

The analysis of the results involves subjecting the parameter estimates of the model to stationary tests to determine their reliability or robustness.

Table I: Unit Root Test of Variables Used in the model

Variables	Variables at level form			Variables at first difference			Order of integration
Variables	ADF.Stat	Lag	5%	ADF.Stat.	Lag	5%	
LAGRICEXP	-2.091662	1	-2.886	-7.127464	2	-2.9241	I(1)
LMANUEXP	-2.176196	1	-2.886	-7.536878	2	-2.9241	I(1)
LOILEXP	-2.660302	1	-2.886	-6.070225	2	-2.9241	I(1)
LOER	0.720162	1	-2.886	-4.084039	2	-2.9241	I(1)

Table I illustrates the unit root of the variables used. The results show that all the variables used in the model have unit roots or are not stationary using 5 per cent level of significance. This is because the Augmented Dickey fuller (ADF) statistic for each variable is lower than the critical values at 5 percent level. At the first difference of each of the variables, the ADF statistic became higher than the critical values at 5 per cent level of significance. This shows that all the variables at their first difference are stationary. Following this result, Johansen cointegration test was conducted which showed that there are two co integrated equations as shown below.

Series: OERVOL LOILEXP LMANUEXP LAGRICEXP
Lags interval: 1 to 4

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.470973	62.93892	47.21	54.46	None **
0.361122	34.28672	29.68	35.65	At most 1 *
0.256276	14.12485	15.41	20.04	At most 2
0.017643	0.801036	3.76	6.65	At most 3

*(**) denotes the rejection of H0 at 5% (1%) respectively significant level

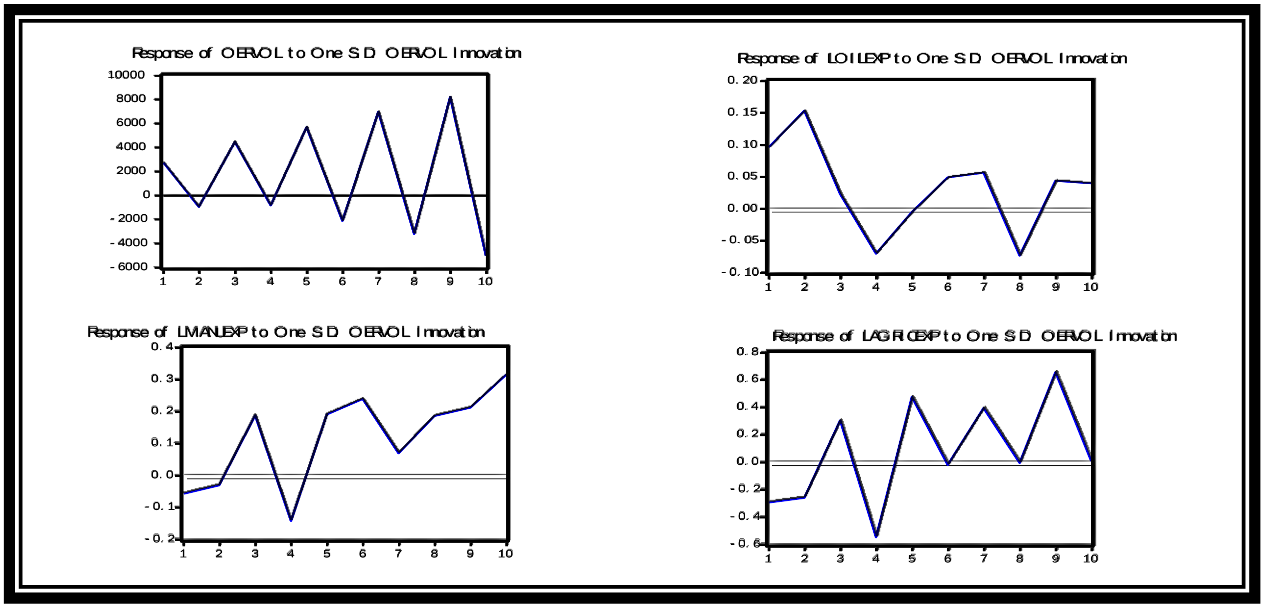
Note that the above table is the illustration of the cointegration test using the Johansen procedure. The Johansen procedure compares the likelihood ratio with the critical values to determine the number of cointegrating equations. From the above table, the likelihood ratio of 62.93892 is greater than the critical values of 47.21 and 54.46 at 5% and

1% significance level respectively while the likelihood ratio of 34.28772 is greater that the critical value of 29.68 at only 5 % level, leading to the rejection of null hypothesis in both cases .This indicates that we have only two co integrating equations.

However, our interest in the work is to trace the response of manufacturing export, oil export and agricultural export to shocks to exchange rate, hence the study only displays the Impulse response and the variance decomposition results. The source of changes in the economic performance was examined through the computation of impulse response functions (IRFs) and variance decomposition (VDC), which in turn were based on the moving-average representation of the VAR model. The IRF indicated the direction and size of the effects of a one standard deviation shock to exchange rate variable on other variable in the system over time. The VDCs showed the percentage of the forecast error variance for each variable that might be attributed to its own innovations and to fluctuations in other variables in the system. Both the IRF and the VDC were used to determine the transmission mechanism of exchange rate shocks in the system.

4.1 Impulse Response Function Analysis

The Plots of Impulse Response Functions of Manuexp, Agricexp and Oilexp to Exchange rate Shocks



The above shows the response of oil export, manufacturing export and agricultural export to innovation to exchange rate over different periods. As shown above, the fluctuation in exchange is detrimental to both the manufacturing export and agricultural export within the immediate period shown by their negative values while it contributes positively to oil export within the same period. Comparing the impact of this fluctuation on the manufacturing export and agricultural export, the result indicates that it hurts (reduces) more the agricultural export compared to the manufacturing exports both in the first and second periods. Generally, comparing the impact of shock to exchange rate on these variables shows that it hurts most the agricultural exports,(it has more negative signs compared to the others) this may be adduced to the fact that agricultural exports are also subject to the vagaries of whether conditions.

4.2 Dynamic Responses to One S.D Innovation to Exchange Rate

Periods	LOILEXP	LMANUEXP	LAGRICEXP
1	0.096521	-0.056008	-0.291821
2	0.153465	-0.029746	-0.256866
3	0.023166	0.189054	0.308188
4	-0.069711	-0.140386	-0.544504
5	-0.004742	0.192040	0.477631
6	0.049335	0.240808	-0.016299
7	0.056967	0.070883	0.398191
8	-0.072904	0.187328	-0.002198
9	0.044295	0.212698	0.659329
10	0.040096	0.316324	0.008774

4.3 Variance Decomposition of Real Outputs Growth rates

The variance decomposition of shock response of the exchange rate elicited the relative response of each variable in the system to the variation in exchange. This, indicate the strength and weakness of the exchange rate in stimulating changes in the oil export, manufacturing export and agricultural export. This in other words shows how shock to exchange rate is being distributed across the variables including exchange rate fluctuation itself. In the first period, innovation to exchange rate does not affect the oil export, manufacturing export and agricultural export. This suggests that exchange rate shock affects these variables after a lag. However, in the second period, the table shows that the impacts of exchange rate shock on these variables are 0.996443, 5.025335 and 0.516581 for the oil export, manufacturing export and agricultural export respectively. This implies that the shock is most felt by the manufacturing export within the second period. Subsequently, the effects on the manufacturing export reduce while those on the agricultural export and oil export increase over time. Considering the entire periods, shocks to exchange rate effect most the agricultural export and is followed by the oil export while the manufacturing export is least affected.

The Variance Decomposition of Exchange Rate Innovation

Periods	OERVOL	LOILEXP	LMANUEXP	LAGRICEXP
1	100.0000	0.000000	0.000000	0.000000
2	93.46164	0.996443	5.025335	0.516581
3	86.95732	2.426175	1.556610	9.059893
4	85.36471	2.328375	2.652912	9.654002
5	83.98054	2.513806	1.291954	12.21371
6	83.89536	2.409098	2.301150	11.39439
7	82.43188	3.015120	1.315223	13.23778
8	82.87639	2.935122	1.824582	12.36391
9	83.05407	3.095542	1.254026	12.59636
10	83.84423	2.999900	1.650090	11.50578

CHAPTER FIVE

5.0 SUMMARY OF FINDINGS, RECOMMENDATION AND CONCLUSION

5.1 SUMMARY OF FINDINGS

This study has made some interesting findings, which were revealed through the variance decomposition and impulse response function. These finding are summarized as follows.

1. As shown by IRF,shock to exchange rate has negative effects on both the manufacturing export and agricultural export in the first two periods but has positive effect to oil within the same period

2. The IFR shows that exchange rate fluctuation is most detrimental to agricultural export compared to oil export and manufacturing export as it is shown to more negative effect compared to others

3. The VDC shows that the exchange rate shock has lag effect on agricultural export,oil export and manufacturing export. That is, its effect starts after first period.

On the average, shock to exchange rate is being borne most by agricultural export,followed by manufacturing export while oil export is least affected

5.2 RECOMMENDATIONS

In order to address the problem of exchange rate fluctuations in the manufacturing, agricultural and all sector, and for the sector to meet expectations and contribute significantly to economic growth and development, the following recommendations will be useful. The need for local sourcing of raw materials and input through agriculture should be intensified. A technological policy aimed at developing a local engineering industry is advocated. By so doing, the link between agriculture and the manufacturing and oil sector will be established leading to expansion of export base which would attract more foreign exchange into the country. This could cumulate into high external reserves build-up and reduce adverse pressure and balance of payment.

Manufacturing activities should be encouraged by government by giving incentives and subsidies to local government and improving the technological and infrastructure development so as to increase the sector contribution to Gross Domestic product and employment within the country.

Change in exchange rate managed strategy should be allowed to run a reasonable course of true. Jettisoning strategies at will and on frequent basis has implication for exchange rate and obvious consequence for a sector that depends on foreign inputs.

The monetary authority (the Central bank of Nigeria) should wonder the unethical practices of some commercial bank which have resulted in much fluctuation in the rate o f exchange. More stringent punitive measures have to be taken against the culprit banks.

5.3 CONCLUSION

The study empirically verified the effect of exchange rate fluctuations on the manufacturing, agricultural and all oil sectors. This is against the backdrop of the fact that exchange rate is a crucial variable and the manufacturing, agricultural and oil sector is expected to be the moving force in the drive towards industrialization. It is observed that the fact that Nigeria is highly dependent on the external sector for import of inputs has made the effect of exchange rate devaluation worse especially in manufacturing because capacity to import was constrained by the depreciating currency heading to a corresponding decline in output. It is pertinent to note that the devaluation of exchange rate in association with factors such as technology and human skills are necessary for a country to be established in the export market which are lacking in the case of Nigeria. The country should therefore, embark on improving basis amenities like, electricity, transportation, water supply, telecommunication, human resource development, instead of implementing policies in an unhealthy economic and social structure.

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Unit root test of the variables at level form

ADF Test Statistic	-2.091662	1% Critical Value*	-3.5713
		5% Critical Value	-2.9228
		10% Critical Value	-2.5990

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LAGRICEXP)
Method: Least Squares
Date: 07/27/13 Time: 05:39
Sample(adjusted): 1963 2010
Included observations: 48 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LAGRICEXP(-1)	-0.192781	0.092167	-2.091662	0.0421
D(LAGRICEXP(-1))	-0.337677	0.135330	-2.495215	0.0163
C	-0.164425	0.173547	-0.947439	0.3485

R-squared	0.250730	Mean dependent var	-0.048363
Adjusted R-squared	0.217429	S.D. dependent var	1.312551
S.E. of regression	1.161123	Akaike info criterion	3.197113
Sum squared resid	60.66926	Schwarz criterion	3.314063
Log likelihood	-73.73072	F-statistic	7.529239
Durbin-Watson stat	2.145209	Prob(F-statistic)	0.001511

ADF Test Statistic	-2.176198	1% Critical Value*	-3.5713
		5% Critical Value	-2.9228
		10% Critical Value	-2.5990

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LMANUEXP)
Method: Least Squares
Date: 07/27/13 Time: 05:39
Sample(adjusted): 1963 2010
Included observations: 48 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMANUEXP(-1)	-0.258976	0.119004	-2.176198	0.0348
D(LMANUEXP(-1))	-0.202508	0.146602	-1.381343	0.1740
C	-0.136656	0.167445	-0.816124	0.4187

R-squared	0.194863	Mean dependent var	0.003824
Adjusted R-squared	0.159079	S.D. dependent var	1.166904
S.E. of regression	1.070071	Akaike info criterion	3.033789
Sum squared resid	51.52735	Schwarz criterion	3.150739
Log likelihood	-69.81093	F-statistic	5.445545
Durbin-Watson stat	2.021508	Prob(F-statistic)	0.007622

ADF Test Statistic	-2.660302	1% Critical Value*	-3.5713
		5% Critical Value	-2.9228

10% Critical Value	-2.5990

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOILEXP)
Method: Least Squares
Date: 07/27/13 Time: 05:40
Sample(adjusted): 1963 2010
Included observations: 48 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOILEXP(-1)	-0.225785	0.084872	-2.660302	0.0108
D(LOILEXP(-1))	-0.159823	0.135588	-1.178742	0.2447
C	-0.587353	0.223662	-2.626073	0.0118

R-squared	0.178157	Mean dependent var	-0.041487
Adjusted R-squared	0.141630	S.D. dependent var	0.752636
S.E. of regression	0.697304	Akaike info criterion	2.177271
Sum squared resid	21.88048	Schwarz criterion	2.294221
Log likelihood	-49.25450	F-statistic	4.877480
Durbin-Watson stat	2.027356	Prob(F-statistic)	0.012099

ADF Test Statistic	0.720162	1% Critical Value*	-3.5713
		5% Critical Value	-2.9228
		10% Critical Value	-2.5990

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OER)
Method: Least Squares
Date: 07/27/13 Time: 05:40
Sample(adjusted): 1963 2010
Included observations: 48 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OER(-1)	0.025379	0.035241	0.720162	0.4751
D(OER(-1))	0.025488	0.158225	0.161085	0.8727
C	2.222274	1.957763	1.135109	0.2623

R-squared	0.015724	Mean dependent var	3.116328
Adjusted R-squared	-0.028022	S.D. dependent var	11.24253
S.E. of regression	11.39896	Akaike info criterion	7.765382
Sum squared resid	5847.129	Schwarz criterion	7.882332
Log likelihood	-183.3692	F-statistic	0.359441
Durbin-Watson stat	1.998127	Prob(F-statistic)	0.700053

ADF Test Statistic	-7.127464	1% Critical Value*	-3.5745
		5% Critical Value	-2.9241
		10% Critical Value	-2.5997

*MacKinnon critical values for rejection of hypothesis of a unit root.

Unit root test of the variables at first difference

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LAGRICEXP,2)
Method: Least Squares
Date: 07/27/13 Time: 05:41
Sample(adjusted): 1964 2010
Included observations: 47 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LAGRICEXP(-1))	-1.763951	0.247487	-7.127464	0.0000
D(LAGRICEXP(-1),2)	0.239886	0.146687	1.635361	0.1091
C	-0.095205	0.174757	-0.544783	0.5887

R-squared	0.727314	Mean dependent var	0.006166
Adjusted R-squared	0.714919	S.D. dependent var	2.236179
S.E. of regression	1.193961	Akaike info criterion	3.254132
Sum squared resid	62.72392	Schwarz criterion	3.372226
Log likelihood	-73.47210	F-statistic	58.67896
Durbin-Watson stat	1.851072	Prob(F-statistic)	0.000000

ADF Test Statistic	-7.536878	1% Critical Value*	-3.5745
		5% Critical Value	-2.9241
		10% Critical Value	-2.5997

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LMANUEXP,2)
Method: Least Squares
Date: 07/27/13 Time: 05:41
Sample(adjusted): 1964 2010
Included observations: 47 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LMANUEXP(-1))	-1.728455	0.229333	-7.536878	0.0000
D(LMANUEXP(-1),2)	0.306506	0.140629	2.179531	0.0347
C	0.037595	0.154551	0.243251	0.8089

R-squared	0.701968	Mean dependent var	0.047879
Adjusted R-squared	0.688421	S.D. dependent var	1.898078
S.E. of regression	1.059493	Akaike info criterion	3.015160
Sum squared resid	49.39112	Schwarz criterion	3.133254
Log likelihood	-67.85625	F-statistic	51.81760
Durbin-Watson stat	1.962098	Prob(F-statistic)	0.000000

ADF Test Statistic	-6.070225	1% Critical Value*	-3.5745
		5% Critical Value	-2.9241
		10% Critical Value	-2.5997

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOILEXP,2)
Method: Least Squares
Date: 07/27/13 Time: 05:42
Sample(adjusted): 1964 2010
Included observations: 47 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOILEXP(-1))	-1.406290	0.231670	-6.070225	0.0000
D(LOILEXP(-1),2)	0.141594	0.147153	0.962221	0.3412
C	-0.059674	0.109991	-0.542532	0.5902

R-squared	0.623068	Mean dependent var	0.014208
Adjusted R-squared	0.605934	S.D. dependent var	1.191522
S.E. of regression	0.747974	Akaike info criterion	2.318804
Sum squared resid	24.61645	Schwarz criterion	2.436898
Log likelihood	-51.49189	F-statistic	36.36590
Durbin-Watson stat	2.052912	Prob(F-statistic)	0.000000

ADF Test Statistic	-4.084039	1% Critical Value*	-3.5745
		5% Critical Value	-2.9241
		10% Critical Value	-2.5997

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OER,2)
Method: Least Squares
Date: 07/27/13 Time: 05:42
Sample(adjusted): 1964 2010
Included observations: 47 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OER(-1))	-0.863258	0.211374	-4.084039	0.0002
D(OER(-1),2)	-0.077937	0.160932	-0.484283	0.6306
C	2.801832	1.788293	1.566763	0.1243

R-squared	0.470812	Mean dependent var	0.029708
Adjusted R-squared	0.446758	S.D. dependent var	15.53470
S.E. of regression	11.55474	Akaike info criterion	7.793771
Sum squared resid	5874.531	Schwarz criterion	7.911865
Log likelihood	-180.1536	F-statistic	19.57316
Durbin-Watson stat	2.005548	Prob(F-statistic)	0.000001

JOHANSEN CO INTEGRATION TEST

Date: 07/27/13 Time: 05:17
Sample: 1961 2010
Included observations: 45
Test assumption: Linear deterministic trend in the data
Series: OERVOL LOILEXP LMANUEXP LAGRICEXP
Lags interval: 1 to 4

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.470973	62.93892	47.21	54.46	None **
0.361122	34.28672	29.68	35.65	At most 1 *
0.256276	14.12485	15.41	20.04	At most 2
0.017643	0.801036	3.76	6.65	At most 3

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

OERVOL	LOILEXP	LMANUEXP	LAGRICEXP
-3.87E-05	-0.199948	0.185412	0.059246
-1.49E-06	-0.094596	-0.015526	-0.058157
3.48E-05	0.095738	-0.323885	0.146571
2.83E-05	-0.221367	0.034079	0.176592

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

OERVOL	LOILEXP	LMANUEXP	LAGRICEXP	C
1.000000	5170.073	-4794.228	-1531.930	3982.622
	(1580.51)	(949.207)	(1238.71)	
Log likelihood	-557.5121			

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

OERVOL	LOILEXP	LMANUEXP	LAGRICEXP	C
1.000000	0.000000	-6141.952	-5127.156	-12605.14
		(3755.22)	(6820.70)	
0.000000	1.000000	0.260678	0.695392	3.208419
		(0.67997)	(1.23504)	
Log likelihood	-547.4312			

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

OERVOL	LOILEXP	LMANUEXP	LAGRICEXP	C
1.000000	0.000000	0.000000	-16852.12	-17319.69
			(25566.9)	
0.000000	1.000000	0.000000	1.193025	3.408515
			(2.67029)	
0.000000	0.000000	1.000000	-1.908996	-0.767598
			(2.54720)	
Log likelihood	-540.7693			

VAR MODEL

Date: 07/27/13 Time: 05:19
Sample(adjusted): 1965 2010
Included observations: 46 after adjusting endpoints
Standard errors & t-statistics in parentheses

	OERVOL	LOILEXP	LMANUEXP	LAGRICEXP
OERVOL(-1)	-0.239337	-2.40E-05	-3.62E-05	-3.57E-05
	(0.28576)	(5.5E-05)	(7.2E-05)	(6.5E-05)
	(-0.83754)	(-0.43323)	(-0.50500)	(-0.54739)
OERVOL(-2)	0.807994	-3.37E-05	0.000101	0.000183
	(0.27166)	(5.3E-05)	(6.8E-05)	(6.2E-05)
	(2.97426)	(-0.63905)	(1.47812)	(2.94970)
OERVOL(-3)	0.019253	9.14E-06	8.88E-05	5.73E-05
	(0.29857)	(5.8E-05)	(7.5E-05)	(6.8E-05)

	(0.06448)	(0.15785)	(1.18472)	(0.84083)
OERVOL(-4)	0.322075	4.45E-05	-7.39E-05	-9.38E-05
	(0.29859)	(5.8E-05)	(7.5E-05)	(6.8E-05)
	(1.07866)	(0.76849)	(-0.98563)	(-1.37746)
LOILEXP(-1)	-109.5234	0.488575	0.238415	-0.021619
	(970.195)	(0.18823)	(0.24349)	(0.22131)
	(-0.11289)	(2.59566)	(0.97916)	(-0.09769)
LOILEXP(-2)	1456.500	0.085083	-0.262603	-0.026780
	(1055.31)	(0.20474)	(0.26485)	(0.24073)
	(1.38016)	(0.41557)	(-0.99151)	(-0.11124)
LOILEXP(-3)	-609.7198	-0.012604	0.319105	0.207018
	(1102.89)	(0.21397)	(0.27679)	(0.25158)
	(-0.55284)	(-0.05890)	(1.15287)	(0.82287)
LOILEXP(-4)	465.7243	0.345685	0.267567	0.247893
	(1009.48)	(0.19585)	(0.25335)	(0.23027)
	(0.46135)	(1.76506)	(1.05612)	(1.07652)
LMANUEXP(-1)	-635.7397	0.041170	0.331046	-0.046603
	(736.738)	(0.14293)	(0.18490)	(0.16806)
	(-0.86291)	(0.28804)	(1.79041)	(-0.27730)
LMANUEXP(-2)	1326.840	0.063408	-0.005510	-0.129105
	(730.321)	(0.14169)	(0.18329)	(0.16659)
	(1.81679)	(0.44752)	(-0.03006)	(-0.77497)
LMANUEXP(-3)	468.2320	-0.183341	0.165075	-0.439532
	(755.913)	(0.14665)	(0.18971)	(0.17243)
	(0.61943)	(-1.25015)	(0.87013)	(-2.54901)
LMANUEXP(-4)	18.73149	0.071792	-0.312275	-0.202107
	(866.432)	(0.16810)	(0.21745)	(0.19764)
	(0.02162)	(0.42709)	(-1.43608)	(-1.02258)
LAGRICEXP(-1)	11.90982	-1.32E-05	-0.086984	0.255417
	(815.562)	(0.15823)	(0.20468)	(0.18604)
	(0.01460)	(-8.3E-05)	(-0.42497)	(1.37292)
LAGRICEXP(-2)	-1486.080	-0.127153	0.022637	0.371077
	(707.523)	(0.13727)	(0.17757)	(0.16139)
	(-2.10040)	(-0.92632)	(0.12748)	(2.29919)
LAGRICEXP(-3)	-728.7096	0.006502	0.069719	0.539625
	(692.935)	(0.13444)	(0.17391)	(0.15807)
	(-1.05163)	(0.04836)	(0.40090)	(3.41391)
LAGRICEXP(-4)	465.8852	-0.078036	0.000230	-0.162529
	(852.147)	(0.16533)	(0.21386)	(0.19438)
	(0.54672)	(-0.47202)	(0.00107)	(-0.83612)
C	4467.353	-0.384025	0.478334	-0.239112
	(2375.70)	(0.46091)	(0.59623)	(0.54192)

	(1.88044)	(-0.83319)	(0.80227)	(-0.44123)
R-squared	0.898096	0.651804	0.704321	0.831467
Adj. R-squared	0.841874	0.459696	0.541188	0.738483
Sum sq. resids	4.55E+08	17.10983	28.63133	23.65332
S.E. equation	3959.130	0.768111	0.993623	0.903123
F-statistic	15.97393	3.392902	4.317468	8.942076
Log likelihood	-435.7141	-42.52444	-54.36596	-49.97300
Akaike AIC	19.68322	2.588019	3.102868	2.911870
Schwarz SC	20.35902	3.263821	3.778670	3.587672
Mean dependent	5920.424	-2.519936	-0.567946	-0.701855
S.D. dependent	9956.298	1.044972	1.466914	1.766027
Determinant Residual Covariance		898335.1		
Log Likelihood		-576.3756		
Akaike Information Criteria		28.01633		
Schwarz Criteria		30.71954		

VEC Model

Date: 07/27/13 Time: 05:20
Sample(adjusted): 1966 2010
Included observations: 45 after adjusting endpoints
Standard errors & t-statistics in parentheses

Cointegrating Eq:	CointEq1	CointEq2		
OERVOL(-1)	1.000000	0.000000		
LOILEXP(-1)	0.000000	1.000000		
LMANUEXP(-1)	-6141.952	0.260678		
	(3755.22)	(0.67997)		
	(-1.63558)	(0.38337)		
LAGRICEXP(-1)	-5127.156	0.695392		
	(6820.70)	(1.23504)		
	(-0.75171)	(0.56305)		
C	-12605.14	3.208419		
Error Correction:	D(OERVOL)	D(LOILEXP)	D(LMANUEXP)	D(LAGRICEXP)
CointEq1	0.360599	2.61E-05	3.44E-05	9.57E-05
	(0.14050)	(2.8E-05)	(3.9E-05)	(3.7E-05)
	(2.56662)	(0.91993)	(0.88983)	(2.60458)
CointEq2	2182.377	-0.061686	0.201593	0.371499
	(802.969)	(0.16187)	(0.22106)	(0.20990)
	(2.71788)	(-0.38107)	(0.91195)	(1.76988)
D(OERVOL(-1))	-1.675026	9.26E-06	-3.20E-05	-0.000143
	(0.30517)	(6.2E-05)	(8.4E-05)	(8.0E-05)

	(-5.48883)	(0.15049)	(-0.38108)	(-1.79227)
D(OERVOL(-2))	-0.481139	-1.21E-05	6.21E-05	2.20E-05
	(0.36680)	(7.4E-05)	(0.00010)	(9.6E-05)
	(-1.31174)	(-0.16335)	(0.61489)	(0.22895)
D(OERVOL(-3))	-0.319570	-0.000122	2.42E-06	-4.70E-05
	(0.37016)	(7.5E-05)	(0.00010)	(9.7E-05)
	(-0.86333)	(-1.63581)	(0.02370)	(-0.48526)
D(OERVOL(-4))	-0.058254	-0.000100	-0.000105	-0.000147
	(0.31089)	(6.3E-05)	(8.6E-05)	(8.1E-05)
	(-0.18738)	(-1.59572)	(-1.23009)	(-1.81304)
D(LOILEXP(-1))	-2388.920	-0.438923	0.025218	-0.513674
	(1064.25)	(0.21455)	(0.29299)	(0.27820)
	(-2.24471)	(-2.04582)	(0.08607)	(-1.84642)
D(LOILEXP(-2))	122.1084	-0.411089	-0.258364	-0.547860
	(1001.66)	(0.20193)	(0.27576)	(0.26184)
	(0.12191)	(-2.03581)	(-0.93693)	(-2.09235)
D(LOILEXP(-3))	-133.9429	-0.437458	0.082284	-0.263742
	(976.021)	(0.19676)	(0.26870)	(0.25514)
	(-0.13723)	(-2.22330)	(0.30623)	(-1.03373)
D(LOILEXP(-4))	-310.5993	-0.097180	0.420122	-0.062264
	(912.084)	(0.18387)	(0.25110)	(0.23842)
	(-0.34054)	(-0.52852)	(1.67315)	(-0.26115)
D(LMANUEXP(-1))	630.3121	0.267355	-0.313330	0.576862
	(899.398)	(0.18131)	(0.24760)	(0.23511)
	(0.70082)	(1.47454)	(-1.26545)	(2.45361)
D(LMANUEXP(-2))	1694.018	0.361713	-0.340895	0.502295
	(896.705)	(0.18077)	(0.24686)	(0.23440)
	(1.88916)	(2.00095)	(-1.38091)	(2.14286)
D(LMANUEXP(-3))	2215.512	0.079903	-0.137524	0.136894
	(857.863)	(0.17294)	(0.23617)	(0.22425)
	(2.58259)	(0.46203)	(-0.58231)	(0.61045)
D(LMANUEXP(-4))	1322.444	0.062358	-0.377373	0.010940
	(732.506)	(0.14767)	(0.20166)	(0.19148)
	(1.80537)	(0.42228)	(-1.87134)	(0.05713)
D(LAGRICEXP(-1))	685.6820	0.132169	0.134632	-0.398659
	(732.571)	(0.14768)	(0.20168)	(0.19150)
	(0.93599)	(0.89496)	(0.66756)	(-2.08179)
D(LAGRICEXP(-	-2040.838	0.021424	0.259329	-0.149356

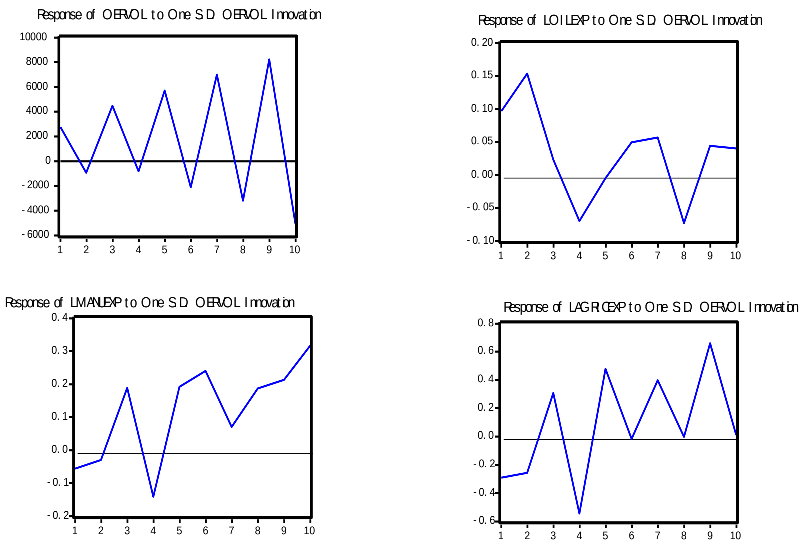
2))				
	(818.222)	(0.16495)	(0.22526)	(0.21389)
	(-2.49424)	(0.12988)	(1.15126)	(-0.69829)
D(LAGRICEXP(-3))	-3225.108	0.029805	0.193106	0.180385
	(792.922)	(0.15985)	(0.21829)	(0.20727)
	(-4.06737)	(0.18646)	(0.88463)	(0.87027)
D(LAGRICEXP(-4))	-2797.603	0.169894	0.117942	-0.020776
	(757.293)	(0.15267)	(0.20848)	(0.19796)
	(-3.69421)	(1.11285)	(0.56572)	(-0.10495)
C	961.3110	0.001330	0.157528	-0.051398
	(615.045)	(0.12399)	(0.16932)	(0.16078)
	(1.56299)	(0.01073)	(0.93034)	(-0.31969)
R-squared	0.909402	0.472553	0.576183	0.710419
Adj. R-squared	0.846680	0.107397	0.282771	0.509940
Sum sq. resids	3.43E+08	13.92441	25.96756	23.41253
S.E. equation	3630.135	0.731816	0.999376	0.948937
F-statistic	14.49896	1.294113	1.963732	3.543612
Log likelihood	-420.3756	-37.45930	-51.48141	-49.15093
Akaike AIC	19.52781	2.509302	3.132507	3.028930
Schwarz SC	20.29062	3.272115	3.895320	3.791743
Mean dependent	955.3603	-0.029850	0.039801	-0.042251
S.D. dependent	9270.928	0.774591	1.180048	1.355542
Determinant Residual Covariance		433118.8		
Log Likelihood		-547.4312		
Akaike Information Criteria		28.06361		
Schwarz Criteria		31.43605		

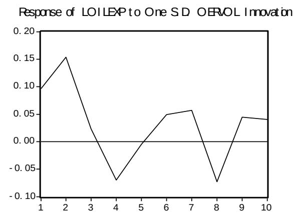
Impulse Response Table

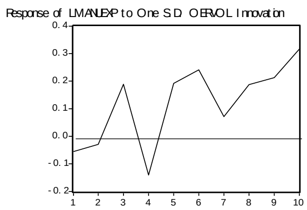
Period	OERVOL	LOILEXP	LMANUEXP	LAGRICEXP
1	2759.327	0.096521	-0.056008	-0.291821
2	-934.0949	0.153465	-0.029746	-0.256866
3	4473.944	0.023166	0.189054	0.308188
4	-817.9238	-0.069711	-0.140386	-0.544504
5	5709.268	-0.004742	0.192040	0.477631
6	-2091.724	0.049335	0.240808	-0.016299
7	7002.735	0.056967	0.070883	0.398191
8	-3187.956	-0.072904	0.187328	-0.002198
9	8232.450	0.044295	0.212698	0.659329
10	-5045.579	0.040096	0.316324	0.008774

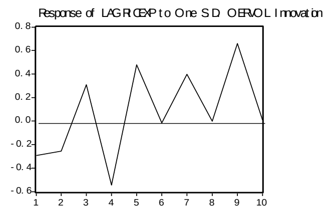
Orderi
ng:
OER
VOL
LOIL
EXP
LMAN
UEXP
LAGR
ICEX
P

Impulse Response Graph









VARIANCE DECOMPOSITION TABLE

Variance Decomposition of LOILEXP: Period	S.E.	OERVOL	LOILEXP	LMANUEXP	LAGRICEXP
1	2759.327	3.010775	96.98922	0.000000	0.000000
2	3013.322	7.824729	91.17203	0.828673	0.174570
3	5725.180	7.185808	88.91571	2.429969	1.468510
4	5845.759	7.690994	84.25004	3.890363	4.168599
5	8576.105	7.050016	84.90574	4.105786	3.938460
6	8879.158	6.938708	83.06521	5.717586	4.278493
7	11820.69	7.255633	81.88845	6.704712	4.151205
8	12298.05	7.999897	80.56793	6.613499	4.818672
9	15248.60	7.914618	77.10005	6.325824	8.659510
10	16145.96	8.059471	76.32263	6.665297	8.952601

Variance Decomposition of LMANUEXP:

Period	S.E.	OERVOL	LOILEXP	LMANUEXP	LAGRICEXP
1	0.556265	0.543612	11.48337	87.97302	0.000000
2	0.648113	0.495328	17.85882	81.20101	0.444840
3	0.681812	4.321234	16.42378	77.17837	2.076615
4	0.705349	5.790973	18.41494	73.29413	2.499965
5	0.736933	7.625797	29.58513	59.57950	3.209574
6	0.766067	10.96609	29.19112	56.26498	3.577807
7	0.778430	10.85378	29.70288	54.32715	5.116185
8	0.784867	12.61679	29.90270	51.83758	5.642934
9	0.804640	14.43652	29.74769	48.83474	6.981048
10	0.809788	18.24254	29.18085	43.61126	8.965351

Variance Decomposition of LAGRICEXP:

Period	S.E.	OERVOL	LOILEXP	LMANUEXP	LAGRICEXP
1	0.759643	16.36801	8.329222	3.538390	71.76438
2	0.901078	23.25070	6.735400	4.744718	65.26918
3	0.959260	30.51361	5.474247	4.597696	59.41445
4	1.013394	38.05448	3.098119	9.134371	49.71303
5	1.124049	44.63610	4.499743	9.285689	41.57847
6	1.186349	42.04460	4.441023	13.07903	40.43535
7	1.211726	42.78910	3.937291	18.78580	34.48781
8	1.241469	40.80308	3.986668	22.31961	32.89064
9	1.288544	46.56653	3.574594	21.47227	28.38660
10	1.364714	42.82317	3.437030	27.63579	26.10401

Variance Decomposition of OERVOL:

Period	S.E.	OERVOL	LOILEXP	LMANUEXP	LAGRICEXP
1	0.721303	100.0000	0.000000	0.000000	0.000000
2	0.806252	93.46164	0.996443	5.025335	0.516581
3	0.898103	86.95732	2.426175	1.556610	9.059893
4	1.194095	85.36471	2.328375	2.652912	9.654002
5	1.314043	83.98054	2.513806	1.291954	12.21371
6	1.354168	83.89536	2.409098	2.301150	11.39439
7	1.473912	82.43188	3.015120	1.315223	13.23778
8	1.509359	82.87639	2.935122	1.824582	12.36391

9	1.711647	83.05407	3.095542	1.254026	12.59636
10	1.784941	83.84423	2.999900	1.650090	11.50578

Ordering: OER VOL LOIL EXP LMAN UEXP LAGR ICEXP