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Determinants of Exchange Rate Instability in Nigeria

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Abstract: ***This paper investigates the determinants of exchange rate instability in Nigeria from 1980 through 2013.Without exchange rate the exchange of goods and services among trading partners will be faced with a lot of problems, which may virtually narrow it down to trade by barter. This exchange also is used to determine the level of output growth of the country. Hence, the rate at which exchange fluctuates calls for a lot of attention. However, with already existing exchange rate policies, a constant exchange rate has not been attained. Having obtained the instability of exchange rate through the various econometrics techniques, the regression test and unit root test was used to examine the various determinants of exchange rate instability in Nigeria, while the co-integration analysis reveals the presence of a long term equilibrium relationship between the various variables and its various determinants and also error correction model (ECM). My empirical analysis further shows that exchange rate EXR, external reserve EXTRESV, interest rate INTR and inflation INFL are among the major variables that influence real gross domestic RGDP during this period. This study recommends that the central monetary authority should institute policies that will minimize the magnitude of exchange rate instability while the federal government exercises control of viable macroeconomic variables which have direct influence on exchange rate fluctuation.***

Keywords: Exchange rate, RGDP, Price instability, Granger causality

1. Introduction

1.1 Background of the Study

The role of exchange rate and its effects on macroeconomic performance has continued to generate interest among economists. Many economists argue that exchange rate stability facilitates production activities and economic growth. They are also of the view that misalignment in real exchange rate could distort production activities and consequently hinders exports growth and generate macroeconomic instability. Exchange rate policy guides investors on the best way they can strike a balance between their trading partners, and investing at home or abroad (Balogun, 2007). Others argued that the exchange rate movements have effects on inflation, prices incentives, fiscal viability, and competitiveness of exports, efficiency in resource allocation, international confidence and balance of payments equilibrium.

Exchange rate refers to the rate at which one currency exchanges for another (Jhingan, 2003). Exchange rate is said to depreciate if the amount of domestic currency require to buy a foreign currency increases, while the exchange rate appreciates if the amount of domestic currency require to buy a foreign currency reduces. An appreciation in the real exchange rate may create current account problems because it leads to overvaluation. Overvaluation in turn makes imports artificially cheaper while exports relatively expensive, thus reducing the international competitiveness of a country (Takaendesa, 2006).

Instability and/or fluctuations in exchange rate hurt producers and investors alike because it affects their projected (planned) revenue and costs, including profits margin. For instance, businesses (base on the exchange rate) set out the amount of money to be committed into acquiring raw materials and equipments/machines from abroad. In the same manner, they estimate their future stream of incomes. Instability in the exchange rate may distort the realization of such estimates. For example, exchange rate depreciation results in high cost of importing raw materials and capital goods. This in turn raises the cost of production and reduces the profits of the firms importing these items. In order to cushion the effects of high cost of production, they (firms) would pass it on to the consumers in form of higher prices. Besides, production will decline and unemployment will rise. Couple with these, are the reduction in exports, accumulation of trade deficits and deterioration of balance of payments, as well as decline in the welfare of the people. In his own view, Obadan, (2006) argued that some of the factors that led to the depreciation of the Nigerian exchange rate include weak production base, import-dependent production structure, fragile export base and weak non-oil export earnings, expansionary monetary and fiscal policies, inadequate foreign capital inflow, excess demand for foreign exchange relative to supply, fluctuations in crude oil earnings, unguided trade liberalization policy, speculative activities and sharp practices (round-tripping) of authorized dealers, over-reliance on imperfect foreign exchange market, heavy debt burden, weak balance of payments position, and capital flight.

1.2 Statement of the Problem

The major problem which this study is designed to solve is whether the exchange rate has any bearing on Nigerians economic growth and development putting into consideration th financial sector of the economy. While some Economist dispute the ability of change in the real exchange rate to improve the trade balance of developing countries because of elasticity of their low export, others believe that structural policies could however change the long-term trends in the terms of trade and the prospects for export led growth. Instabilities of the foreign exchange rate is also a problem to the economy.

1.3 Objective of the Study

The broad objectives of this study is to determine the impact of exchange rate instability in Nigeria. Other specific objectives include: The main objectives of exchange rate policy in Nigeria are:

1) To maintain favourable external reserve position
2) To have a realistic exchange rate which will remove the existing distortion and disequilibrium in the external sector of the economy.
3) To ensure price stability in other to improve the level of real gross domestic product.

2. Conceptual Review

Inflation Rate

It is acknowledged that non-monetary or cost-push factors have been present in the recent Nigerian inflation experience and, therefore the relationship between money supply movements and the price level had not been on a one-on-one basis.

However, the association between the two has been quite remarkable. The inflation rate rose sharply from 10.2 percent in 1987 to 38.3 percent in 1988 as the growth in money supply rose also sharply from 13.7 to 41.9 percent (Odozi, 1993). The inflation rate increased further to *50.5* percent to 21.5 percent and fell steadily after July 1990.ln 1991 and first half of 1992, inflation rate stood at 13.0 and 27.0 percent respectively, as money stock increased by 32.6 and *26.5* percent. Inflation rate peaked at 72.8 percent in *1995* and was a major problem in the economy during the first half of the 1990's. The major factor responsible for the poor inflation performance was the expansionary fiscal stance of the three tiers of government.

Reflecting the impact of monetary policy tightening and improvement in fiscal prudence, the inflation rate decelerated rapidly from 72.8 percent in 1995 to 6.9 percent in 2000. However, the declining trend in inflation rate was reversed in 2001 up till 2004 to 18.9 percent and 14.8 percent, but has declined also in recent time from 17.9 percent in 2005 to a single digit of 6.6 in 2007. The rate had a turn in 2008 to 15.1 percent down to 13.9 percent in 2009, owing to excessive government spending of the excess earnings from crude oil exports. Thus it appears evident from this experience that money supply growth has contributed or facilitated the sharp increases in the inflation rate in some years and served as a restraining force in others.

Interest Rates

Following interest rate deregulation in August 1987, bank deposit, lending rates moved upwards on average by about 3% and 6 percentage points to 12.4% and 16.50%, respectively, and hovered at about the new levels until late 1989 (Odozi, 1993). This was due to the undue discretion it conferred on key market players in pricing their Hinds as well as the arbitraging activities of the market players.

Although market interest rates were at historically high levels at the end of 1989, the inflation rate was even higher and real interest rates remained negative. It was expected that improvements in both bank liquidity and inflation would bring down interest rates to much lower levels. In spite of these developments, market rate of interest showed no perceptible decline.

Savings deposit rates ranged from *13.5%* to 25.0%, while prime lending rates ranges from 26.0% to 60.0% for commercial banks and 42.0% and 80.0% for merchant banks in 1993. This resulted in the widening of the margin between bank's savings and lending rates. Such high rates seriously discouraged investments especially in the directly productive sectors of the economy. Similarly, the persistently high and rising government deficits financing resulted in the crowding out of the private sector in the credit market (Essien, 2007).

Exchange Rate

Under the current floating exchange rate regime, the stability of the Naira exchange rate is a major objective of monetary policy. An inflationary expansion of money supply under the system would not only exert an upward pressure on the domestic price level, but also a down-ward pressure on the value of the Naira (Odozi, 1993). This could happen either as a result of an excessive expansion in the demand for imports and therefore, foreign currency or because of inflationary expectations alter the currency preferences of economic agents in favour of foreign currencies. In practice, this shows itself in the foreign exchange demand pressure on banks and a widening gap between the official and other markets for foreign exchange. The wider this gap becomes, the more intense the speculative pressure on the official market. Thus, while the large initial depreciations of the Naira in 1986 and 1987 were mainly the result of the previous over-valuation of the currency, subsequent movements in the exchange value of the currency have been influenced by the high level of aggregate demand and speculations.

Real gross domestic product (GDP)

Real gross domestic product (GDP) is an inflation-adjusted measure that reflects the value of all goods and services produced by an economy in a given year, expressed in base-year prices, and is often referred to as "constant-price," "inflation-corrected" GDP or "constant dollar GDP." Unlike nominal GDP, real GDP can account for changes in price level and provide a more accurate figure of economic growth. GDP is a macroeconomic assessment that measures the value of the goods and services produced by an economic entity in a specific period, adjusted for inflation. GDP is derived by valuing all production by an economy using a specific year's average prices. Governments use GDP as a comparison tool to analyze an economy's purchasing power and growth over time. This is done by looking at the economic output of two periods and valuing each period with the same average prices and comparing the two together. (Business Dictionary.com)

External Reserve

Foreign-exchange reserves (also called forex reserves or FX reserves) is money or other assets held by a central bank or other monetary authority so that it can pay if need be its liabilities, such as the currency issued by the central bank, as well as the various bank reserves deposited with the central bank by the government and other financial institutions.

Reserves are held in one or more reserve currencies, mostly the United States dollar and to a lesser extent the Japanese yen etc. (Business Dictionary.com)

2.1 Theoretical Review

Exchange Rate Policy in NigeriaThe most important themes that emerge in the discussion of exchange rates and their management in Nigeria include the high volatility, real exchange rate overvaluation in the context of continuous nominal depreciation, and the search for mechanism for market-determined rate where government is the dominant supplier of foreign exchange. Exchange rate stability is one of the goals of monetary policy in Nigeria, and over the years exchange rate policy has been driven mostly by an obsession to keep the nominal exchange rate 'stable'. For the general public, the health of the economy is gauged by the nominal exchange rate where a depreciating rate is synonymous with a weakening economy.

However, in Nigeria, the exchange rate policy has undergone substantial transformation from the immediate post-independence period when the country maintained a fixed parity with the British pound, through the oil boom of the 1970s, to the floating of the currency in (since) 1986, following the near collapse of the economy between 1982 and 1985 period (Akpan and Atan 2012)

2.2 The Purchasing Power Parity Theory

The purchasing power parity (PPP) is one of the earliest and perhaps most theory of exchange rate between two currencies would be equal to the relative national price levels, it assumes the absence of the trade barriers and transactions cost and existence of the purchasing power parity (PPP). In its version the purchasing power parity (PPP) doctrine equates the equilibrium exchange rate of the ratio of domestic to foreign price level.

Where, E = is the nominal exchange rate defined interims of domestic currency per unit of foreign currency. Pd is the foreign price, PE level with perfect efficiency and absence of trade barriers transactions cost and the purchasing power parity./ the PPP doctrine would be tantamount to the application of the law of one price if all the countries produced exactly the same tradable goods. It is important to know that the PPP is a major component of the monetary approach. The PPP between the two currencies as provided by Gustav Cassel 1998 is the amount of the purchasing power. The PPP is long-term approach used in the determination of equilibrium exchange rate. It is often applied s a proxy for the monetary model in exchange rate analysis (CBN, 1998).

The relative version of PPP doctrine relates the equilibrium exchange rate to the product of the exchange rate in a base period and the ratio of the countries price Indices, by definition, we have the relate Purchasing power party (PPP) as Where Ro is the actual exchange rate at the base period (the number of units of domestic currency per unit of foreign currency). The purchasing power theory parity theory defines two equilibrium rate systems. The first is the short run equilibrium exchange rate which is defined, in this context, as the rate that would exist under a purely freely floating exchange rate balance. Second is the long-run equilibrium that would yield balance of payment equilibrium over a time period in cooperating and cyclical fluctuations in the balance of payments (including those of prevailing exchange rate from the relative purchasing power in a currency are generally attributed to problem of arbitrage and expectations in the goods market. Some4 of the assumption of PPP theory however are quite unrealistic. Efficiency level for examples vary from country to country and as such there are deferring cost functions.

Fasanya, Onakoyaand Agboluaje (2013) explain that since the establishment of the Central Bank of Nigeria (CBN) in 1959 has continued to play the traditional role expected of a central bank, which is the regulation of the stock of money in such a way as to promote the social welfare.

2.3 Empirical Literature

Empirical evidence has shown strong effect of short-run and long-run adverse effect of exchange rate swings on economic growth performance through the trade channel. The nature of the effect, however, runs in either position or negative direction. According to IMF (1984) and European commission (1990) empirical evidence in favour of a systematic positive (or negative) effect of exchange rate stability on trade (and thereby growth) in small open economies has remained mixes. Bachetta and van wincoop (2000) found based on a general equilibrium framework that exchange rate stability on trade. Gravity models have been used as frame work to quantify the impact of exchange rate stability on trade and growth, in particular in the context of monetary union. Using panel estimations for more than 180 countries Edwards and Levy Yeyati (2003) found evidence that countries with more flexible exchange rate grow faster. Eichengreen and Lablang (2003) found strong negative relationship between exchange rate stability and growth for 12 countries over a period of 120 years. They conclude that the results of such estimations strongly depend on the time period and the sample found robust evidence that exchange rate stability is associated with more growth in the EMU periphery. The evidence, according to him, is strong for EMERGING Europe which has moved from an environment of high macro-economic instability to macro-economic stability during the observation period. Other empirical studies examines the role of capital market in ensuring exchange stability and economic growth. another study undertook and investigation aimed at finding any relationship between regional trade agreement (RTA) and growth. He focused on whether openness size of population and the gross domestic product (GDP) affect growth of countries that have entered into RTA. The results show that economies with open economics gorw faster. He also provided evidence that the level of development on neighbouring open economies have some spill over effect.

By contrast, the lead level of development in open economics has no little on domestic growth. Their empirical work found out that regional agreement made up of developing nations has had no significance contributions to trade expansion. It is also noted that productivity index has no significant influence on real exchange rate volatility

during this period. These findings is partly consistent with the findings of Al-Samara (2009) who investigated the determinant of exchange rate volatility in Nigeria and Syrian economy. Countries with low results according to them grow faster than those with high tariff. This confirms the earlier theoretical literature in favour of trade liberalization the forgoing literatures examined have known all positive relationship between trade and growth, in the words of Onah (2002), trade liberalization policy. In Nigeria, was a companied in 1987 budget and the rate of inflation has been encouraging. In her own view, the rate of inflation has been reasonably controlled though not reduced thoroughly. In spite of their effort to reduced prices the local industries are collapsing because of inadequate demand for their products.

However, Boadiary and Trendenick (1978) using static applied general equilibrium (first generation) found that remove or tariff in Canada would cause welfare to declined by about to trade deterioration resulting from an import tariff reduction, as implied by national product differentiation assumption has to conclude rather caterically that unilateral trade liberalization is and E (>0) and (<0) – the income elasticities of demand for exports and imports respectively.

Extensive empirical research shows that x/p is a very good predictor of country's long run growth performance, so that allowing for differences INP, income growth and export growth are highly correlated. The conclusive evidence that most developing countries are balance of payment constrained growth rate (or financed by capital inflows) while resources lie idle domestically in these circumstances, export growth will raise output growth by relating balance of payments constraints on demand irrespective of any supply-side effects of capital flows.

In an open economy context the major component of autonomous demand is export growth and faster export growth allows for other components of demand to grow faster. It is possible, as mc combine does, to then disaggregate the contribution to growth exports and other components of demand within this demand-oriented framework.

Onah (2002) has it that with trade liberalization, the structure of the export trade of developing countries has however, undergone a substantial transformation. Since 19890's with rapid growth in the export of manufacturer, this by the early 1990's and hand come to be the dominant flow of merchandise from developing to developed countries represented three continued to manufacture exports to developed countries represented three times the values of non-oil commodities had exceeded the value of manufactured exports.

The empirical work which has been undertake to explore possible links between exchange rates and macro-economic variables is based on the analytical framework developed by Kamin (1997) which provides evidence on the existence of an empirical relationship between the rate of inflation and the level of the real exchange rate in selected Latin and Asian countries and advance industrialisation economics. As a fellow to the analytical framework provided by Kamin (1991), this study is designed to examine to foreign exchange market in Nigeria with the view of investigating the relationship between the exchange rates and some macro-economic variables.

Morely (1992) analyzed the effect of real exchange on output for twenty-eight devaluation experiences in developing countries using a regression framework. It was explicitly concluded that exchange rate devaluation is a major factor for the upsurge inflation (Kamin 1996, Odedoolkun, 1996, Jongbo, Olajide Clement (2014). Kamin (1996) showed that the level of rate of inflation in Mexico during the 1980's and 1990s. Kamin, also reached similar conclusions for some African countries including Nigeria. Dell' Arricia (1999) examined the effect of exchange rate fluctuation on the bilateral trade of European union members plus Switzerland over the period 1975 – 1994 using several definitions of volatility. In basic OLS regression, exchange rate fluctuation had a small but significant negative impact on trade; reducing volatility to zero in 1994 would have increased trade by an amount ranging from the ten to 13 percent, depending on the measures of fluctuation used using both fixed and random effects, the impact of fluctuation was still negative and significant but smaller in magnitude. The author found that elimination of exchange rate fluctuation would have increased trade by about 3 percent in 1994.

Mauna and Reza (2001) studies the effect of trade liberalisation, real exchange rate and trade diversification on selected North Africa countries Morocco, Algeria and Tunisia. By decomposing in real exchange rate into fundamental and monetary determinants, and by using both standard statistical measures of exchange rate fluctuation and the measures of exchange rate risk develo, they reached the conclusion that exchange rate depreciation has a positive effect on the quantity or manufactured exports while exchange rate misalignment, volatility or fluctuation has a negative effect. According to them, the motivating result is that all manufacturing sub-sectors are responsive to exchange rate change but the degree of responsiveness differs across sectors.

In their study, Soludo (1998) found that real exchange rate volatility depresses trade in differentiated goods. The study used bilateral trade model, where the oils (ordinary least square) and GMM (Generalized method of moment) methods were used. After taking into account the direction of causality, they ascertained that a 10 percent increase in volatility depresses differentiated product trade by 0.7 percent, while a 10 percent increase in trade reduces exchange rate volatility by 0.3 percent. Their Ols estimated results showed that the effect or volatility on trade is reduced by 70percent. They justified the result by arguing that much of the correlation between trade and change to the effect that trade has in depressing fluctuation. Their study further revealed that a 10 percent increase in the intensity of bilateral trading relationship reduces the volatility if the associated exchange rate by 0.3 percent.

However, their model did not take into consideration the cross price effects. Exchange rate acts as shock absorb if rigidly fixed, the shocks of inflation and deflation and deflation from aboard are transmitted to internal economy

systems. But variations in the exchange can wand off the invasion of the inflationary and deflationary forces. If demand and supply could work excellently in economic sense, it would be better to allow exchange rate to be freely determined by both demand and supply.

In conclusion, most of the economic analysis indicated that devolutions (either increases in the level of the real exchange rate or in the rate of depreciation) were associated with a reduction in output and increase in inflation.

Nigeria is regarded as the largest oil producing nation in Africa and the tenth Largest oil producing nation in the world interim of oil reserves with a production level of close to 2 million barrels per day, though this level has been seriously affected due to crises in the oil production region Nigeria benefited handsomely from likes in the oil. Since the beginning of second guild war. The balance of payment portion of the country remains highly favourable with over 20 months of imports, which translates to over & 55 billion of reserves. Exchange rate was moderately stable between 2000 and 2008, while real GDP growth average 5.01 percent within the same period.

3. Methodology of Research

This chapter included sources of data, method of data analysis and model specification. We will employ the single equation technique of econometric simulation for this study. This has become expedient because of its theoretical plausibility, explanatory ability, accuracy of the parameter estimate, simplicity and forecasting ability (Gujarity and Porta 2009p).

3.1 Model Specification and Sources Of Data

Gross Domestic Product (GDP) is a function of many variables, therefore for this empirical study, a synthesized model of both Nigeria and other Countries was employed. Specifically the model for this work is:

$$\mathbf{RGDP= \beta\ o+ \beta_1 EXR + \beta_2 INF+ \beta_3 INTR+ \beta_4 EXTRESV+ U}$$

Where; **RGDP** =Real Gross Domestic Product
EXR = Exchange Rate
INF = Inflation
INTR = Interest Rate
EXTRESV = Number of Deal
U = Random Variable

Note: This work is different from the model adopted by others because, it added some diagnostic test such as the Augmented Dickey-Fuller unit root test for stationerity and co-integration test, error correction model (ECM) and granger causality test

A Priori Expectation
It is expected that EXR, INF, INTR and EXTRESV are positively related to Real Gross Domestic Product. That is, given

$RGDP_t= \beta o+ \beta_1 EXR + \beta_2 INF+ \beta_3 INTR+ \beta_4 EXTRESV_+ U_t$
$\beta o, \beta_1, \beta_2, \ldots\ldots\ldots\ldots, \beta_5 > 0,$

Diagnostic Tests
The Augmented Dickey-Fuller unit root test for stationarity and Error Correction Model (ECM). These tests were carried out to ensure correct specification of the model. OLS technique and E-views package was used to estimate the parameters of the specified model.

Source and Nature of Data
The major sources of data on this study relies mainly on secondary data, the data were obtained from the Central Bank of Nigeria's "Statistical Bulletin" and the National Bureau of Statistic's"Annual Abstract of Statistics." In addition, include some economic and financial magazines as well as journals, and business and financial news papers will also be consulted in the course of this work.

4. Result and Discussion

Table 1: Regression Results

Dependent Variable: RGDP				
Method: Least Squares				
Date: 05/26/15 Time: 11:55				
Sample: 1980 2013				
Included observations: 34				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXR	2006.356	3289.436	0.609939	0.0223
INFL	4094.202	5291.260	0.773767	0.4451
INTR	10663.06	12788.15	0.833823	0.4110
EXTRESV	6.619055	10.59543	0.624708	0.0169
R-squared	0.779924	Mean dependent var		463901.1
Adjusted R-squared	0.755471	S.D. dependent var		461322.8
S.E. of regression	487662.5	Akaike info criterion		29.14277
Sum squared resid	7.13E+12	Schwarz criterion		29.32234
Log likelihood	-491.4270	Hannan-Quinn criter.		29.20400
Durbin-Watson stat	1.857237			

Sources: E-Views 7 output

Table 1 contains multiple regression results for exchange rate instability in Nigeria proxy by RGDP, Interest Rate, Inflation, External Reserve and Exchage Rate in Nigeria. The results indicate that the coefficients of inflation (INF), Interest rate (INTR), are statistically insignificant while exchange rate (EXR) and external reserve (EXTRESV) are found to be statistically significant with probability value of 0.2832, 0.0223, and 0.0169 at 1 per cent respectively.

DW (Durbin-Watson) =1.871093 shows that there is element of positive autocorrelation meaning that there is a linear relationship between Real Gross Domestic Product (RGDP) and the independent variables.

Table 2: Unitroot Test for RGDP

Null Hypothesis: D(RGDP) has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 1 (Fixed)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-6.366027	0.0001
Test critical values:	1% level		-4.284580	
	5% level		-3.562882	
	10% level		-3.215267	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(RGDP,2)				
Method: Least Squares				

Date: 05/26/15 Time: 12:01				
Sample (adjusted): 1983 2013				
Included observations: 31 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RGDP(-1))	-1.964320	0.308563	-6.366027	0.0000
D(RGDP(-1),2)	0.317110	0.178402	1.777503	0.0868
C	-40638.77	224479.1	-0.181036	0.8577
@TREND(1980)	3959.963	11187.40	0.353966	0.7261
R-squared	0.779924	Mean dependent var		23964.41
Adjusted R-squared	0.755471	S.D. dependent var		1119737.
S.E. of regression	553708.4	Akaike info criterion		29.40658
Sum squared resid	8.28E+12	Schwarz criterion		29.59161
Log likelihood	-451.8020	Hannan-Quinn criter.		29.46689
F-statistic	31.89494	Durbin-Watson stat		2.180516

The R^2 value of 0.779924implies that 77.99 per cent of the total variation in the economy (RGDP) in Nigeria was explained by external reserve (EXTRESV), exchange rates (EXR) and interest rate (INTR) and inflation (INFL). Coincidentally, the goodness of fit of the regression remained high after adjusting for the degree of freedom as indicated by the adjusted R^2 (R^2 = 0.755471 or 75.55%). The R-Square suggested that not only the included variables of the model that affect the interest rate in Nigeria, but there are other variables, although their influence is higher insignificant than those variables captured in the model. The Durbin-Watson statistics (2.180516) in table 2 is higher than R^2 (0.779924) indicating that the model is non-spurious.

Analysis of ADF Test

Table 4.3: Unit Root Test

Variable	ADF	Order of Integration
RGDP	-5.661850(-3.552973)	1(0)
INTR	-5.167679(-3.562882)	1(1)
INFL	-5.770659(-3.562882)	1 (1)
EXTRESV	-3.702312 (-3.557759)	1(1)
EXR	-3.936002 (-3.562882)	1(1)

Source: Appendix.

Critical values (in parenthesis) are at 5% level of significance. The results of the ADF test in Table 4.1 indicate that Rgdp is stationary at levels, but Inf, Intr, Extresv and Exr are not stationary but cointegrated at 1st order difference.

Table 4.4: Pairwise Granger Causality Tests

Pairwise Granger Causality Tests			
Date: 05/26/15 Time: 12:36			
Sample: 1980 2013			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
INTR does not Granger Cause RGDP	32	0.21599	0.8071
RGDP does not Granger Cause INTR		3.06884	0.0630
INFL does not Granger Cause RGDP	32	1.78073	0.1877
RGDP does not Granger Cause INFL		0.72505	0.4935
EXTRESV does not Granger Cause RGDP	32	2.48744	0.1020
RGDP does not Granger Cause EXTRESV		0.31576	0.7319
EXR does not Granger Cause RGDP	32	1.61571	0.2174
RGDP does not Granger Cause EXR		0.27279	0.7633
INFL does not Granger Cause INTR	32	2.95888	0.0689
INTR does not Granger Cause INFL		6.28981	0.0057
EXTRESV does not Granger Cause INTR	32	0.75956	0.4776
INTR does not Granger Cause EXTRESV		0.18546	0.8318
EXR does not Granger Cause INTR	32	1.58817	0.2228
INTR does not Granger Cause EXR		0.13918	0.8707
EXTRESV does not Granger Cause INFL	32	1.21582	0.3122
INFL does not Granger Cause EXTRESV		0.01957	0.9806
EXR does not Granger Cause INFL	32	1.31096	0.2862
INFL does not Granger Cause EXR		0.72270	0.4946
EXR does not Granger Cause EXTRESV	32	5.70985	0.0085
EXTRESV does not Granger Cause EXR		0.44367	0.6463

The results of causality are contained in table 4. The results revealed that one-way causation existed between real gross domestic product(RGDP) and interest rate (INTR) but the causation runs from real gross domestic product (RGDP) to interest rate (INTR) implying that RGDP can cause INTR but not the other way round.One-way causation also existed between real gross domestic product (RGDP) and inflation (INFL) but the causation runs from inflation (INFL) to real gross domestic product(RGDP) implying also that INFL can cause RGDP but not the other way round.. The result further indicated that no causation existed between exchange rates (EXR) and real gross domestic product (RGDP), inflation (INFL) as well as interest rate (INTR), no causation existed between external reserve (EXTRESV) and the real gross domestic product (RGDP).

Table 4.5: Co-Intigration test result

Date: 05/26/15 Time: 12:14				
Sample (adjusted): 1982 2013				
Included observations: 32 after adjustments				
Trend assumption: Linear deterministic trend				
Series: RGDP INTR INFL EXTRESVEXR				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.742636	81.98810	69.81889	0.0039
At most 1	0.473743	38.55568	47.85613	0.2783
At most 2	0.270663	18.01277	29.79707	0.5651
At most 3	0.219048	7.912962	15.49471	0.4747
At most 4	3.83E-05	0.001226	3.841466	0.9715
Trace test indicates 1 cointegratingeqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.742636	43.43242	33.87687	0.0027
At most 1	0.473743	20.54292	27.58434	0.3048
At most 2	0.270663	10.09980	21.13162	0.7352
At most 3	0.219048	7.911736	14.26460	0.3877
At most 4	3.83E-05	0.001226	3.841466	0.9715
Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Cointegration analysis

Co intergration analysis is carried out to determine the existence of long-run relationship that exists between the dependent variables and the regressors. When one or all variables is/are non-stationary at level, it means they have stochastic trend. Essentially, co-integration is used to check if the independent variable now (short-run) or in the future

(long-run). The long run relationships among the variables are examined using the Johasen (1991) intergration frame work.The co-integration result is represented in table 4.

From the co-integration result the indication of two co-integrating equations from the trace test statistic was observed. To this end, we reject the null hypothesis that there is no co-integration between variables in the model. In conclusion, we validate the existence of a long run relationship between RGDP, INFL, INTR, EXTRESV, and EXR in the model.

4.6 Error Correction Model (ECM)

The Engel-Granger (1987) developed an error correction technique to examine cointegrating vectors. This cointegration test is based on an examination of the residuals of a spurious regression performed using 1(1) variables. If variables are cointegrated then the residuals should be 1(0). On the other hand if the variables are not cointegrated then the residuals will be 1(1). This test applies Error Correction Model (ECM) technique. After establishing stationary of the data, Johansen Co-integration test is applied to determine whether a long run relationship exist among the variables in question.

When it is established that the variables are co-integrated, an over-parameterized model (ECM1) is developed which involves leading and logging of the variables after which parsimonious model (ECM2) is built in accommodate short-run dynamic in the model. The ECM was also used in estimating the speed of adjustment to the deviation in the long run equilibrium.

The over parameterized ECM was specified as follows:
RGDP, INFL, INTR, EXTRESV, and EXR

Where: RGDP is the real gross domestic product, INF is Inflation rate, INTR is interest rate, EXTRESV is External reserve and EXR exchange rate

5. Summary and Conclusion

Exchange rate has been an important aspect of any existing economy in an attempt to promote good balance of payment. It is in this perspective that thispaper seeks to examine the determinants ofexchange rate instability in Nigeria using the generalized regressive Conditional test, unit root test, co-integration and Vector Error Correction Model. Based on theextant literatures, we identify relevant variables that influence exchange rate instability in Nigeria (Real Gross Domestic Product, Inflation, interest rate, External Reserve and Exchange), which include in the model estimation.The empirical results of the cointegration analysis shows that there is long run equilibrium relationship among the variables, Analyzingthe direction and magnitude of the explanatory variable coefficients, i observed that real gross domestic product, inflation rate, exchange rate and interest rate are significant determinants of exchange rate instability during the period 1980-2013, though they all have different magnitude of influence on the instability of exchange rate.

Furthermore, this study investigated empirically the impact of variables such as exchange rate (EXR), interest rate (INT), inflation rate (INF), real gross domestic product(RGDP) and external reserve (EXTRESV) were used for analysing purpose. All data used are secondary data obtained from the Statistical Bulletin of Central Bank of Nigeria.,

Having seen that exchange rate instability have an impact on the economy. Thus, there is need to maintain a stable exchange rate. Hence with stable exchange rate, it will help to curtail inflation, maintain a favourable balance of trade, boost export of domestic commodities and above all, maintains steady growth of the economy.

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Appendix 1: Data Used for this Reserch

YEAR	RGDP	EXR	INFLA	INTR	EXT RESV
1980	672202.7	0.55	9.9	6.25	5,462.00
1981	716949.7	0.61	21.4	6.25	2,441.6
1982	31546.76	0.6729	7.2	7.75	1,043.3
1983	205222.1	0.7241	23.2	7.75	224.4
1984	199685.3	0.7649	40.7	9.75	710.1
1985	185598.1	0.8938	4.7	9.75	1,657.9
1986	183563	2.0206	5.4	9.75	2,836.6
1987	201036.3	4.0179	10.2	15.10	7,504.6
1988	205971.4	4.5367	56	13.70	5,229.1
1989	204806.5	7.3916	50.5	21.40	3,047.6
1990	219875.6	8.0378	7.5	22.10	4,541.4
1991	236729.6	9.9095	12.7	20.10	4,149.3
1992	267550	17.2984	44.8	22.10	1,554.6
1993	265379.1	22.0511	57.2	23.99	1,429.6
1994	271365.5	21.8861	57	15.00	9,009.1
1995	274833.3	21.8861	72.8	13.96	1,611.1
1996	2754451	21.8861	29.3	13.43	3,403.9
1997	281407.4	21.8861	10.7	7.46	7,222.2
1998	293745.4	21.886	7.9	9.98	7,107.5
1999	302022.5	81.0228	6.6	12.59	5,424.6
2000	310890.1	81.2528	6.9	10.67	9,386.1
2001	312183	81.6494	18.9	9.98	10,267.1
2002	329178.7	83.8072	12.9	16.50	7,681.1
2003	356994.3	92.3428	14	13.04	7,467.8
2004	433203.5	100.8016	15	13.32	16,955.0
2005	477533	111.701	17.8	10.82	28,279.1
2006	527576	126.2577	8.2	8.35	42,298.1
2007	561931.4	134.0378	5.4	8.10	51,333.2
2008	595821.6	132.3704	11.5	11.84	53,000.4
2009	634251.1	130.6016	12.6	12.85	42,382.5
2010	761696.8	128.2796	13.8	5.67	32,339.3
2011	806444.4	129.1462	10.9	4.70	32,639.8
2012	816749.7	131.1424	12.2	7.18	43,830.4
2013	874243.6	130.1273	12.4	5.41	42,847.3

Appendix 2

Regression Result

Dependent Variable: RGDP				
Method: Least Squares				
Date: 05/26/15 Time: 11:55				
Sample: 1980 2013				
Included observations: 34				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXR	2006.356	3289.436	0.609939	0.0223
INFL	4094.202	5291.260	0.773767	0.4451
INTR	10663.06	12788.15	0.833823	0.4110
EXTRESV	6.619055	10.59543	0.624708	0.0169
R-squared	0.779924	Mean dependent var		463901.1
Adjusted R-squared	0.755471	S.D. dependent var		461322.8
S.E. of regression	487662.5	Akaike info criterion		29.14277
Sum squared resid	7.13E+12	Schwarz criterion		29.32234
Log likelihood	-491.4270	Hannan-Quinn criter.		29.20400
Durbin-Watson stat	1.857237			

Unit Root Test for RGDP

Null Hypothesis: D(RGDP) has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 1 (Fixed)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-6.366027	0.0001
Test critical values:	1% level		-4.284580	
	5% level		-3.562882	
	10% level		-3.215267	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(RGDP,2)				
Method: Least Squares				
Date: 05/26/15 Time: 12:01				
Sample (adjusted): 1983 2013				
Included observations: 31 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RGDP(-1))	-1.964320	0.308563	-6.366027	0.0000
D(RGDP(-1),2)	0.317110	0.178402	1.777503	0.0868
C	-40638.77	224479.1	-0.181036	0.8577
@TREND(1980)	3959.963	11187.40	0.353966	0.7261
R-squared	0.779924	Mean dependent var		23964.41
Adjusted R-squared	0.755471	S.D. dependent var		1119737.
S.E. of regression	553708.4	Akaike info criterion		29.40658
Sum squared resid	8.28E+12	Schwarz criterion		29.59161
Log likelihood	-451.8020	Hannan-Quinn criter.		29.46689
F-statistic	31.89494	Durbin-Watson stat		2.180516
Prob(F-statistic)	0.000000			

Unit Root Test for INTR

Null Hypothesis: D(INTR) has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 1 (Fixed)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-5.167679	0.0012
Test critical values:	1% level		-4.284580	
	5% level		-3.562882	
	10% level		-3.215267	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(INTR,2)				
Method: Least Squares				
Date: 05/26/15 Time: 12:06				
Sample (adjusted): 1983 2013				
Included observations: 31 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INTR(-1))	-1.494818	0.289263	-5.167679	0.0000
D(INTR(-1),2)	0.258504	0.189328	1.365376	0.1834
C	1.970093	1.481059	1.330193	0.1946
@TREND(1980)	-0.113967	0.074467	-1.530437	0.1375
R-squared	0.620445	Mean dependent var		-0.105484
Adjusted R-squared	0.578272	S.D. dependent var		5.422062
S.E. of regression	3.521118	Akaike info criterion		5.475348

Sum squared resid	334.7534	Schwarz criterion		5.660379
Log likelihood	-80.86790	Hannan-Quinn criter.		5.535664
F-statistic	14.71198	Durbin-Watson stat		1.881570
Prob(F-statistic)	0.000007			

Unit Root Test for INFL

Null Hypothesis: D(INFL) has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 1 (Fixed)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-5.770659	0.0002
Test critical values:	1% level		-4.284580	
	5% level		-3.562882	
	10% level		-3.215267	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(INFL,2)				
Method: Least Squares				
Date: 05/26/15 Time: 12:09				
Sample (adjusted): 1983 2013				
Included observations: 31 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFL(-1))	-1.416661	0.245494	-5.770659	0.0000
D(INFL(-1),2)	0.411502	0.171901	2.393828	0.0239
C	3.869630	7.018378	0.551357	0.5859
@TREND(1980)	-0.205008	0.349421	-0.586709	0.5623
R-squared	0.592521	Mean dependent var		0.464516
Adjusted R-squared	0.547245	S.D. dependent var		25.78602
S.E. of regression	17.35066	Akaike info criterion		8.665052
Sum squared resid	8128.222	Schwarz criterion		8.850083
Log likelihood	-130.3083	Hannan-Quinn criter.		8.725367
F-statistic	13.08701	Durbin-Watson stat		2.063041
Prob(F-statistic)	0.000018			

Unit Root Test for EXTRESV

Null Hypothesis: D(EXTRESV) has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 1 (Fixed)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.058845	0.0169
Test critical values:	1% level		-4.284580	
	5% level		-3.562882	
	10% level		-3.215267	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(EXTRESV,2)				
Method: Least Squares				
Date: 05/26/15 Time: 12:11				
Sample (adjusted): 1983 2013				
Included observations: 31 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXTRESV(-1))	-0.851805	0.209864	-4.058845	0.0004
D(EXTRESV(-1),2)	0.333523	0.195673	1.704493	0.0998
C	-16.25446	2152.676	-0.007551	0.9940
@TREND(1980)	56.33441	108.9858	0.516897	0.6094
R-squared	0.387778	Mean dependent var		13.39355
Adjusted R-squared	0.319753	S.D. dependent var		6451.863
S.E. of regression	5321.309	Akaike info criterion		20.11674
Sum squared resid	7.65E+08	Schwarz criterion		20.30177
Log likelihood	-307.8095	Hannan-Quinn criter.		20.17706
F-statistic	5.700542	Durbin-Watson stat		1.969233
Prob(F-statistic)	0.003707			

Unit Root Test for EXR

Null Hypothesis: D(EXR) has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 1 (Fixed)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.936002	0.0223
Test critical values:	1% level		-4.284580	
	5% level		-3.562882	
	10% level		-3.215267	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(EXR,2)				
Method: Least Squares				
Date: 05/26/15 Time: 12:12				
Sample (adjusted): 1983 2013				
Included observations: 31 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXR(-1))	-1.091411	0.277289	-3.936002	0.0005
D(EXR(-1),2)	0.071783	0.193809	0.370378	0.7140
C	2.583420	4.651134	0.555439	0.5832
@TREND(1980)	0.109609	0.235730	0.464976	0.6457
R-squared	0.508748	Mean dependent var		-0.034774
Adjusted R-squared	0.454165	S.D. dependent var		15.56029
S.E. of regression	11.49605	Akaike info criterion		7.841797
Sum squared resid	3568.294	Schwarz criterion		8.026828
Log likelihood	-117.5479	Hannan-Quinn criter.		7.902113
F-statistic	9.320553	Durbin-Watson stat		1.999634
Prob(F-statistic)	0.000213			

Co-Intigration Test Result

Date: 05/26/15 Time: 12:14				
Sample (adjusted): 1982 2013				
Included observations: 32 after adjustments				
Trend assumption: Linear deterministic trend				
Series: RGDP INTR INFL EXTRESV EXR				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.742636	81.98810	69.81889	0.0039
At most 1	0.473743	38.55568	47.85613	0.2783
At most 2	0.270663	18.01277	29.79707	0.5651
At most 3	0.219048	7.912962	15.49471	0.4747
At most 4	3.83E-05	0.001226	3.841466	0.9715
Trace test indicates 1 cointegratingeqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.742636	43.43242	33.87687	0.0027
At most 1	0.473743	20.54292	27.58434	0.3048
At most 2	0.270663	10.09980	21.13162	0.7352
At most 3	0.219048	7.911736	14.26460	0.3877
At most 4	3.83E-05	0.001226	3.841466	0.9715
Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Pairwise Granger Causality Tests

Pairwise Granger Causality Tests			
Date: 05/26/15 Time: 12:36			
Sample: 1980 2013			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
INTR does not Granger Cause RGDP	32	0.21599	0.8071
RGDP does not Granger Cause INTR		3.06884	0.0630
INFL does not Granger Cause RGDP	32	1.78073	0.1877
RGDP does not Granger Cause INFL		0.72505	0.4935
EXTRESV does not Granger Cause RGDP	32	2.48744	0.1020
RGDP does not Granger Cause EXTRESV		0.31576	0.7319
EXR does not Granger Cause RGDP	32	1.61571	0.2174
RGDP does not Granger Cause EXR		0.27279	0.7633
INFL does not Granger Cause INTR	32	2.95888	0.0689
INTR does not Granger Cause INFL		6.28981	0.0057
EXTRESV does not Granger Cause INTR	32	0.75956	0.4776
INTR does not Granger Cause EXTRESV		0.18546	0.8318
EXR does not Granger Cause INTR	32	1.58817	0.2228
INTR does not Granger Cause EXR		0.13918	0.8707
EXTRESV does not Granger Cause INFL	32	1.21582	0.3122
INFL does not Granger Cause EXTRESV		0.01957	0.9806
EXR does not Granger Cause INFL	32	1.31096	0.2862
INFL does not Granger Cause EXR		0.72270	0.4946
EXR does not Granger Cause EXTRESV	32	5.70985	0.0085
EXTRESV does not Granger Cause EXR		0.44367	0.6463