Percieved Relationship between Exchange Rate, Interest Rate and Economic Growth in Nigeria: 1970-2010

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This study was specifically embarked upon to establish empirically the relationship exiting among Exchange rate, Interest rate and economic growth in Nigerian economy over the period of 1970-2010. Fundamentally, the period of the study was fractured into two prominent distinctions of economic era- the regulation era and the deregulation era. The study adopted vector auto- regression (VAR) technique, with specific emphasis on Impulse Response factor and the Forecast Error Variance Decomposition. The result indicated that Exchange rate had a stronger impact on Economic growth than Interest rate. Particularly, Interest rate impact was found to be positive but however declined as the time horizon increased. It had a little impact on Economic growth in the period of regulation than in the deregulation era. The conclusion arising from the study shows that Exchange rate liberalization was good to Nigerian Economy as it promotes Economic growth. Interest rate liberalization on the other hand does not make an appreciable impact on the Economic growth as it undermines investment drive. The paper therefore recommends that Interest rate liberalization and deregulation should be replaced with the policy of Interest rate regulation as obtained in the 1970s and early 1980s.

Key Words: Economic growth, interest rate, exchange rate, international trade, acroeconomic, financial crises

Introduction

Exchange rate regime and interest rate remain important issues of discourse in the International finance as well as in developing nations, with more economies embracing trade liberalization as a requisite for economic growth. Theoretical and empirical literatures abound, devoted to identifying the most appropriate regime that boosts economic growth and exact significant impacts on macroeconomic and financial variables.

The exchange rate and interest rate policies in Nigeria for example have changed within the time frame from regulated to deregulated regimes. However the impacts of such policies on economic growth in Nigeria have remained controversial. Some authors argue that high cost of credit is created which rather hampers investment in the economy (David *et-al,* 2010).

In the early 1980s, the Nigerian economy began to witness crises with devastating consequences on the world commodity prices as a result of global economic recession. This subsequently created structural imbalances occasioned by the collapse of oil prices which adversely affected the Nation's revenue. As a result, large fiscal deficit, huge external current account deficit, surging unemployment and Inflation rate amidst declining domestic investment

input were experienced. Even recently, the global economic and financial meltdown that started from USA and spread to other parts of the world is already catching up with the Nigerian economy, and particularly her financial system.

The response of policy makers in Nigeria in attempt to contain these spates of external shocks has always been occasioned by introduction of one economic reform or the other. By mid 1986 the government in collaboration with the IMF/World Bank initiated Structural Adjustment Programme (SAP) aimed at sorting out the then crises with the ultimate intension of setting the economy on the path of growth. Other policy response applied within the last decade with similar purpose is the National Economic Empowerment and Development Strategy (NEEDS) introduced in 2004. The general purpose of this all encompassing policy is to stem the tide of unemployment especially amongst the youth and ever rising price level in the economy. At the moment, the economic development blue print slogan is the vision 20:2020. Though the macroeconomic environment seems to be relatively stable, the economic fundamentals like inflation, savings, investment, growth, unemployment and poverty are still knotty issues of great concern. Hence the macroeconomic policy with regard to exchange rate, interest rate, domestic investment and economic growth has been

the centre piece of policy makers' attention and that of the development partners.

Though the economic reforms of the 1980s witnessed some significant level of development especially in the financial system, there were still so many unresolved economic problems. In particular, interest rate has remained extremely high with devastating impacts on the cost of borrowing and investment in Nigeria, which has been the bane of discouragement of foreign investment. The exchange rate, which was hitherto at par with US dollar prior to SAP is now exchanging for about N160 to a US dollar. The anticipated growth of the economy to absorb the unemployed has remained elusive. Of particular concern is the expected diversification of the Nigerian economy from the state of monoculture, which still remains a mirage as the proportion of manufactured exports to total export is at low level (Soyibo, 2010). The oil sector is still maintaining its dominant posture as the major source of foreign exchange in the economy. The real sectors of the economy such as Agriculture and Industry are consistently declining (Okoroafor, 2010).

Furthermore, the economy is still and essentially bedeviled by large size and inefficient public sector, low rates of savings and investment, persistent large budget deficits, and inconsistent macroeconomic environment. All these have hampered the growth of the economy (Sanni, 2006); and Nigerians still remain expectant to brighter days ahead that improvements in the exchange rate and interest rate management could make a difference to the economic growth efforts. However, the observed facts of exchange rate and interest rate management on macroeconomic variables that would culminate into economic growth are sluggish and not impressive let alone being sustainable. In this regard, Oweoye and Onagowora (2007) observed that what Nigeria gains from International trade and domestic investment is not consistent with the reform put in place expected to attain robust result. Accessing of funds for investment is still a challenge with lending rate being very high compared to deposit rate in the economy. The end result is that almost four decades of policy summersault especially in exchange rate and interest rate management, the Nigerian economy has not benefited immensely from the processes.

In the light of the above stated issues, this study is poised with the following questions: Is exchange rate and interest rate positively or negatively related to economic growth in Nigeria? Secondly, which of the two variables impacted more on economic growth in Nigeria in the periods under study? Thirdly, is the policy regime of the regulation era friendlier to economic growth in Nigeria than that of the deregulation era? Therefore, in providing answers to these pertinent questions, which inform   the basis of the principal objectives that would be discussed in this study. The remaining portion of the paper is structured into four parts. The second part is the literature review and theoretical framework; the third part is the methodological issues. The fourth and fifth parts are for analysis of results, summary and conclusion respectively.

Literature Review and Theoretical Framework

Exchange rate is the price of one country's currency expressed in terms of some other currency. It determines the relative prices of domestic and foreign goods, as well as the strength of external sector participation in the international trade. On the other hand, interest rate is seen as a reward for accumulating financial assets and foregoing current consumption. It is the cost of capital which influences the demand for loan-able funds by different types of borrowers (Soludo, 2008; 2009). In most monetary policy regimes, interest rate and exchange rate are used as policy instruments to achieve low inflation rate and stabilize the economy. However, since the re-invention of the financial liberalization concepts in the 1970's, many countries have made attempts to liberalize the economy by deregulating exchange rate and interest rates, eliminating credit controls, allowing free entry into the banking sector, permitting private ownership of banks, international trade liberalization and capital flows. However of these dimensions of liberalization, exchange rate and interest rate liberalization has been the most pertinent. Unfortunately the Nigerian experience in this regard has been mixed.

Review on interest rate and economic growth

There has been widespread belief that the original theory of financial liberalization which the Breton Woods Institution upheld was sold to many developing countries. In particular, the pre-conditions for their implementation and the consequences of the theory were not taken as part of the bargain for their effectiveness by these countries. From the early 1970s, the relationship between interest rate liberalization and economic growth has been an issue of great debate both theoretically and empirically. It is believed that low interest rate would promote investment spending and economic growth in both developed and developing economies in line with the Keynesians and Neoclassical theories (Odhiambo, 2008).

The argument that interest rate liberalization leads to financial development and economic growth

is based on theoretical framework and analytical underpinnings by McKinnon (1973) and Shaw (1973). According to their financial liberalization theory of which interest rate liberalization is the centre piece, a liberalized financial sector enables savers to switch from unproductive real assets to financial assets-hence expanding the supply of credit in the economy. In this way, financial liberalization impacts on economic growth through its influences on savings, financial deepening and investment.

In view of the above, it is worth noting that there exists disparity between the Keynesians and McKinnon-Shaw school. The Keynesian school believes in prior investment, while the McKinnon – Shaw school believes in Prior savings. For instance, McKinnon (1973) argued that supply rather than demand for loan-able fund constrains investment in developing countries. He further put forward that this is because financial sectors in developing countries are highly repressed and the demand for loan-able fund exceeds the supply. In this way, an increase in interest rate will attract increases in deposits of loan-able funds; thereby leading to increases in financial deepening, investment and economic growth. Ironically the Nigerian government in the periods of 1970-1985 pursued the policy of regulation of interest rate ceilings which made loan-able funds available for public sector spending at the detriment of the private sector investment which crowded out. In the era of 1986-2010, the interest rate policy was more of deregulation and guided deregulation with the aim of encouraging private sector initiative as an impetus for economic growth and employment generation

As it were, some studies have also empirically highlighted the relationship between interest rate and economic growth. For instance, Obamuyi (2009) investigated the relationship between interest rate and economic growth in Nigeria using time series data covering 1970-2006. He applied co-integration and error correction model to capture both the long run and short run dynamics of variables in the model. The result indicated that real lending rates have significant effect on economic growth. Nicholas (2010) also examined the dynamic relationship between interest rate reforms; bank based financial development and economic growth in South Africa using co-integration and Error correction models, the study finds a strong support for the positive impacts of interest rate reforms on financial development. The study also discovered that interest rate reforms do not Granger cause investment and economic growth.

Chete (2006) also investigated the relationship between real interest rate and economic growth in Nigeria. The result showed that there was a unique

long run relationship between interest rate and economic growth. He summed thus: that interest rate is an important determinant of economic growth in Nigeria. However, the deregulation of interest rate in Nigeria may not optimally achieve its goal if those other factors that affect investment negatively are not sorted out and tackled, he concluded.

Review on exchange rate and economic growth

Nigeria practised fixed exchange rate regime from Independence up to 1986 when it was abolished and replaced with flexible exchange rate regime. The flexible exchange rate regime as it were is the follow-up to the structural Adjustment Programme (SAP), designed to devalue the naira in order to encourage exports in Nigeria. But Nigeria is noted as an import dependent economy, particularly for her capital goods. And the manufacturing sector to which exchange rate devaluation was targeted to encourage for increased export is dominated by multinational corporations and incapacitated by low capacity utilization. The result is that this sector is rather hampered by high interest rate, high cost of raw materials for production, rising inflation, naira depreciation, foreign exchange shortages and consumer strong resistances to local products. So exchange rate devaluation rather than be a blessing is a curse in disguise for this sector.

Accordingly, Olisadebe (1991) report showed a worrisome development in the naira exchange rate especially from the period of SAP as it continued to depreciate. As a result people have continually called for the fixing of the exchange rate even at par with the United State dollar. On the equilibrium of exchange rate, the author further maintained that such rate ensures the simultaneous attainment of internal and external balance.

The choice of exchange rate regime is indeed significant for economic growth efforts, but depends on the level of development of the economy in question (David et-al, 2010). As for the industrialized economies with complete markets and deeper financial markets, real and financial shocks are better managed that economic growth rate does not depend much on their choice of exchange rate regimes. Although a more flexible exchange rate regime can permit an economy to make necessary adjustment more rapidly; but on the margin, more flexible regime is weakly associated with slightly higher growth rates. In developing and emerging economies such as those in Asia and Africa with less depth in the financial markets, and more incomplete markets, they are less able to deal with real and financial shocks, and hence the choice of exchange rate regime is more important (Oyejide and Udun 2010).

Rogoffs and Reinhartl (2004) opined that developing countries are relatively better off in the choice of flexible exchange rate regimes. While Oyejide and Udun (2010) added that countries at a relatively early stage of financial development and integration are better-off choosing fixed or relatively rigid regimes. Furthermore, David et-al (2010) submitted that for developing and emerging market countries a non-linear relationship exists between growth and regime choice, with fixed and managed float regimes associated with the highest rate of growth. They further pointed out that regime choice does not affect the rate of economic growth for the advanced European countries. Concluding that more flexible regimes are rather associated with slightly higher growth rates over there.

Ubok-udom (1999) examined the issues surrounding the implementation of SAP in Nigeria, and drew up a conclusion that the peculiar features of Nigerian economy reduced the efficacy of currency depreciation in producing desirable effects. From the study of the relationship between exchange rate variation and growth of the domestic output in Nigeria (1971-1995); he expressed growth of domestic output as a linear function of variations in the average nominal exchange rate. He further used dummy variables to capture the periods of currency depreciation. The empirical result showed that all coefficients of the major explanatory variables have negative signs. Meanwhile, Ogun (2006) study on the impacts of real exchange rate on growth of non-oil export in Nigeria highlighted the effects of real exchange rate misalignment and volatility on the growth of non-oil exports. He employed the standard trade theory model of determinants of export growth and two different measures of real exchange misalignment, one of which entails deviation of the purchasing power parity (PPP), and the other which is model based estimation of equilibrium real exchange rate (ERER). He observed that irrespective of the alternative measures of misalignment employed, both real exchange misalignment and volatility adversely affected growth of Nigerian non-oil exports.

But Adebiyi and Dauda (2009) using error correction model argued on the contrary that trade liberalization promoted growth in the Nigerian industrial sector and stabilized the exchange rate market between 1970 and 2006. To them, there was a positive and significant relationship between index of industrial production and real export. A one per cent rise in real export increases the index of industrial production by 12.2 per cent. By implication, it means that the policy of deregulation impacted positively on export through exchange rate depreciation. However, Rodric (2006) study on the relation between exchange rates and economic growth in Kenya revealed otherwise that there was no statistically significant direct relationship between the two variables. They are however indirectly linked through several channels, including money, imports, agricultural production and foreign aid.

Analytical Methodology

The model

In order to determine the relationship between exchange rate, interest rate and economic growth in Nigeria, we assume that there exists a considerable level of relationship among the three variables. This according to Sims (1989) and Todd (1990) implies that such variables should all be treated equally and no a priori distinction between endogenous and exogenous variables. In this regard, they developed a Vector auto regression (VAR) model which has been employed in several studies. In a VAR model, each variable is regressed on its own lag and the lags of other variables in the model. In this way the procedure allows each variable to be affected by its own past values and the past values of every other exogenous variable in the given model. This minimizes the problem of simultaneity (Kretzer, 1992).

A VAR model depicting simultaneous relationships between exchange rate, interest rate and economic growth in Nigeria maybe specified as follows:

$$ECG_t = \propto_{ij} + \sum_{j=i}^{k} \beta_{ij} ECG_{t-j} + \sum_{j=i}^{k} \lambda ij \, EXR_{t-j} + \sum_{j=i}^{k} \theta ij \, INR_{t-j} + \mu ij \dots \dots \dots (1)$$

$$EXR_t = \propto_{2j} + \sum_{j=i}^{k} \beta_{2j} ECG_{t-j} + \sum_{j=i}^{k} \lambda_{2j} \, EXR_{t-j} + \sum_{j=i}^{k} \theta_{2j} INR_{t-j} + \mu_{2j} \dots \dots \ \dots \dots (2)$$

$$INR_t = \propto_{3j} + \sum_{j=i}^{k} \beta_{3j} ECG_{t-j} + \sum_{j=i}^{k} \lambda_{3j} \, EXR_{t-j} + \sum_{j=i}^{k} \theta_{3j} INR_{t-j} + \mu_{3j} \dots \dots \dots \dots (3)$$

Where:

ECG_t = current level of economic growth.

ECG_{t-j} = lagged value of economic growth

INR_t = current level of interest rate.

INR_{t-j} = lagged value of interest rate

EXR_t = current value of exchange rate

EXR_{t-j} = lagged value of exchange rate

$\propto_{ij}$ = intercept

β_{ij} = coefficient of economic growth

λ_{ij} = coefficient of exchange rate

θ_{ij} = coefficient of interest rate

μ_{ij} = stochastic error term

Estimation procedures

When dealing with time series data, it is important we establish the stationarity status of the variables in the model in other to avoid spurious result (Gujarati, 2005). According to Engel and Granger (1987) parameter estimates from such a regression may be biased and inconsistent. Therefore, these data would be tested for stationarity using the Augmented Dickey-Fuller (ADF) test proposed by Dickey and Fuller (1981).

Furthermore two procedures out of the several procedures of VAR would be engaged to reaffirm the tests. The two procedures are Impulse response (IR) and the forecast error variance decomposition (FEVD). The IR produces estimates to show impacts of one variable on itself and others, as well as the direction of relationship over a given time horizon. The FEVD on the other hand produces estimates showing the relative contributions of each variable to the forecast error of the model. The two procedures are useful for evaluating the explanatory and predictive power of each variable in the model.

Data sources

The data for this study that covers the period of 1970-2010 is extracted from the Central Bank of Nigeria Statistical Bulletin, various issues.

Analysis/Discussion of Results

The unit root result presented in table 1 below indicates that two out of the three time series data in the models were stationary at levels and significant at 5 percent. The variables are exchange rate (EXR) and Rate of Interest (RIN). The third variable, economic growth rate (ECG) was stationary only at first differencing.

Table 1. ADF unit root test results.

variables	Unit root coeff.	t-statistics	Normalised biased stat.	Serial correlation stat.	
				G(1)	G(2)
RIN	0.55	3.67(i(0))*	0.07	0.001	0.01
EXR	0.55	3.05(I(0))*	0.97	0.00	0.07
ECG	0.06	1.39	NA	0.12	0.08
ΔRIN	1.77	7.66*	NA	0.04	0.06
ΔEXC	2.51	12.37*	1.99	0.00	0.01
ΔECG	0.95	5.69*	NA	0.52	0.66

Note: (i) the variables are tested at levels and at first differencing. The results are reported at absolute values.
(ii) G(1) and G(2) are Godfrey statistics for 1st and 2nd order serial correlation in residuals.
(iii) (*) indicates significance at 5 percent level of significance.

Furthermore, the Godfrey statistics test report indicates that serial correlation of these variables are insignificant, which makes the estimates highly dependable. Also the cointegression test of the variables confirms the existence of long run equilibrium relationship among the variables. Since the variables are found to be stationary at levels and first differencing, the results from the estimation of the models are unlikely to be biased and inconsistent. The test conducted so far shows that the variables under study posses desirable empirical characteristics that qualify them to be included in a vector auto-regression (VAR).

Impulse response

The impulse response of the variables over a five period horizon is presented in table 2 below. In the first segment of the table, the result shows that the coefficient of rate of interest (RIN) is very low; indicating that interest rate in Nigeria is not volatile. The coefficient declines even as the time horizon increases. This reveals that interest rate movement in Nigerian economy is sluggish.

Table 2. Orthogonalised Impulse Response to one unit shock in the VAR.

Horizon	Dependent variable	Explanatory variables		
		RIN	EXR	ECG
1	RIN	6.01	-0.36	1.82
2	RIN	3.67	-0.24	1.17
3	RIN	2.15	0.28	0.81
4	RIN	1.34	0.18	0.61
5	RIN	0.82	0.12	0.54
1	EXR	0.00	12.55	-0.53
2	EXR	0.66	13.40	-1.07
3	EXR	2.83	14.08	-1.34
4	EXR	4.25	14.48	-1.43
5	EXR	5.11	14.72	-1.34
1	ECG	0.00	0.00	5.19
2	ECG	0.79	0.09	0.17
3	ECG	0.03	0.49	0.39
4	ECG	0.06	0.56	0.04
5	ECG	0.11	0.62	-0.02

Note: Order of VAR=2

The same is true and applicable with the other two variables of our study. The coefficient of EXR and ECG are reported to have positive signs in some periods and negative in the other periods. However, no coefficient of EXR and ECG appears to be significant either at 1 percent or 5 percent levels. This reveals that relatively, interest rate does not respond to exchange rate and economic growth rate movement in Nigeria over the period that our study covered and vice versa.

The second segment of the table shows the response of EXR to itself, as well as its response to RIN and ECG; while the third segment shows the response of ECG to itself as well as response to RIN and EXR.

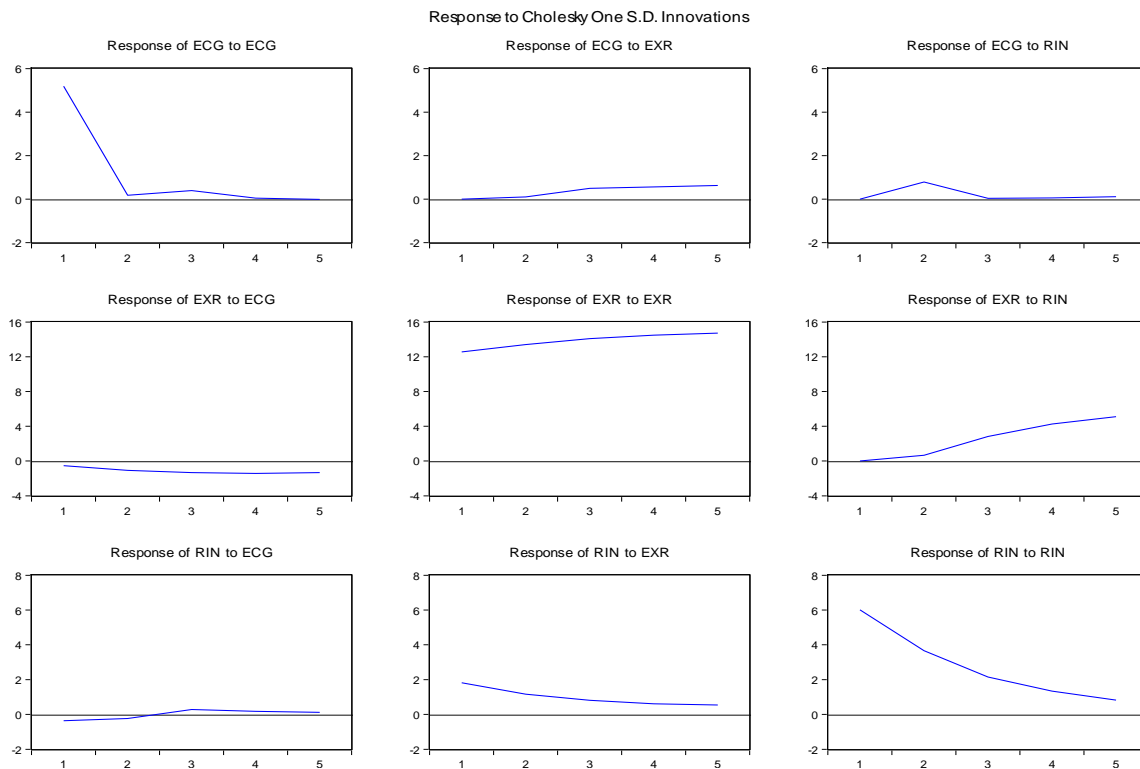Response to Cholesky One S.D. Innovations

Figure 1. Orthogonalized impulse responses to one SE shock in the equation.

The auto-response of these three variables to each other is considerably low, and declines within a certain range of the horizon. This is clearly shown and reflected in figure 1. This indicates, they are all non-volatile in the economy. The little variation observed in their coefficients over the horizon is an indication of the fact that the responses are somewhat sensitive to time.

It is also worth noting that at the initial stage of our study periods; exchange rate had a negative impact on interest rate, and later on impacted it positively but insignificantly. On the model involving ECG as the dependent variable, the exchange rate impact on economic growth was positive and very low initially, but as the time horizon changed, its impact became increasingly positive in dimension. Further analysis of our result shows that interest rate at the early stage of the study exhibited a positive relationship with the rate of economic growth; but as the time horizon progressed, its impact though positive was on the decline.

Forecast error variance decomposition (vector auto-regression).

The analysis so far establishes that exchange rate (EXR) as well as interest rate (RIN) exerts an impact but exchange rate influences a higher impact on economic growth rate (ECG). The rate of Interest made a positive but declining insignificant impact on ECG. It is also important to determine which of the two variables contributed more to the forecasting power of economic growth. This is done by analyzing the forecast error variance decomposition (FEVD) estimates obtained from the Vector auto-regression as adapted from EDO (2009). The estimates are reported in table 3 indicating the relative contribution of EXR and RIN to the forecasting error of ECG.

Table 3. Orthogonalized forecast error variance decomposition in the VAR.

Horizon	Dependent variable	Explanatory variables		
		RIN	EXR	ECG
1	RIN	91.30	8.36	0.34
2	RIN	91.08	8.57	0.35
3	RIN	90.65	8.90	0.45
4	RIN	90.33	9.19	0.49
5	RIN	90.00	9.50	0.50
1	EXR	0.00	99.82	0.18
2	EXR	0.13	99.45	0.42
3	EXR	1.54	97.87	0.59
4	EXR	3.42	95.91	0.68
5	EXR	5.16	94.15	0.69
1	ECG	0.00	0.00	100.0
2	ECG	2.25	0.03	97.72
3	ECG	2.22	0.90	96.88
4	ECG	2.21	1.99	95.80
5	ECG	2.22	3.32	94.47

Note: Order of VAR=2

Estimate in the third segment of the table shows the relative contribution of EXR and RIN to the forecast error of ECG as well as own contribution by ECG for the five period horizon. It can be observed that the contributions of EXR are the smallest in value, which clearly indicates that exchange rate tends to enhance more the forecasting power of economic growth rate model by minimizing forecast errors. The first and second segment shows the distribution of forecast error for RIN and EXR respectively.

Policy Implications

The foregoing analysis has revealed that the Nigerian economy and its growth rate are not volatile in nature. And also that exchange rate devaluation impacts positively on economic growth than the interest rate does. In line with recommendation that exchange rate liberalization promotes economic growth; on the other hand interest rate liberalization do not create an appreciable impact on the economy rate of growth. This occurrence further reveals that with respect to interest rate, the regulated period of 1970-1985 was accompanied by greater positive impact on the economy than the period of deregulation, 1986-2010.

In view of the findings of this study, it is therefore suggested that the policy of exchange rate deregulation and devaluation should be pursued as it is beneficial to economic growth effort of the

country. Nonetheless, interest rate should be regulated as its policy of deregulation makes a sluggish and declining impact on economy growth rate. Its impact was more clearly felt in the economy during the era of regulation than in the periods of deregulation.

Conclusion and Recommendation

The study focused on establishing empirically the relationship between exchange rate, interest rate and economic growth in Nigeria over the period of 1970-2010. Economic growth is vital to any Government as it holds the key to economic wellbeing through mitigating problems of inflation, saving, unemployment and investment, to mention just but few. Macroeconomic policy reforms especially with reference to exchange rate and interest rate have tenaciously been pursued in Nigeria over the period of our study. These are reflected in two basic economic reform eras- the regulated era and deregulated era. In the regulated era, 1970-1985, interest rate and exchange rate were completely left in the control of the monetary authorities to ensure availability of funds and foreign exchange to propel economic growth in the public sector led economy. As a result, the economic growth rate responded positively with interest rate, and initially related negatively with exchange rate of the Naira to the US dollar. However, under the era of deregulation where the market forces dictated the pace; exchange rate in particular impacted on economic growth positively on incremental basis. The interest rate impact of economic reforms in economic growth rate though positive was on the declining trend. This brings to the fore that the whole essence of deregulation was to encourage private sector led economy. But as investment a major factor to economic growth was weakened by high interest rate, the private sector became unable to borrow meaningfully and invest maximally in the economy. As investment of the private sector was negatively affected by high levels of interest rate, the economy grew sluggishly with declining insignificant positive impacts of interest rate.

Going by the result of this study, we tend to draw a conclusion to the fact that based on Nigerian data; emphasis on exchange rate deregulation is good to the economy. But financial sector deregulation with focus on interest rate liberalization does not yield the desired result in the economy as its impact on economic growth rate is insignificant. Hence, we recommend that interest rate should be regulated. However, this conclusion runs contrary to the research result conducted by Mckinnon (1973) and Shaw (1973) to the effect that interest rate

liberalization leads to financial sector development and economic growth in the developed as well as developing economies. This research report calls for further investigation among the developed and developing countries where interest rate and exchange Rate play dominant roles in the economic development.

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