International Journal of Management Studies, Business & Entrepreneurship Research
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 5, Number 1, March 2020
http://www.casirmediapublishing.com

EMPIRICAL ANALYSIS OF THE IMPACT OF MACROECONOMIC VARIABLES ON EXCHANGE RATE: AN EVIDENCE FROM NIGERIA

Awatai Abdu Usman; Nanfa Nimvyap & Mary Pam
Department of Economics
Plateau State University, Bokkos, Nigeria
E-mail:uawatai72@gmail.com; **Corresponding Author: Awatai A.U**

ABSTRACT
The major aim of this research is to provide empirically the evidence on the relationship between Real Exchange rate (REXR) against US dollar and macroeconomic variables in Nigerian economy from 1985 to 2017. This research has taken real exchange rate as dependent variable and some other macroeconomic variables are as independent variables. To examine this relationship the ordinary least square regression (OLS) technique is used. The result shows that inflation rate (IFR) is negatively significant at 10% level, the foreign direct investment (FDI) is negatively significant at 5% level, Gross domestic product (RGDP) is negatively significant at level 5% and Money supply (MS) is positively significant at 5% level, interest rate (IR) is positively significant at 5% level of significant with real exchange rate (REXR). The INF and FDI is negatively forced the exchange rate mean that when the values of these variable is decrease the value of exchange will be increasing but in case of RGDP is Vice versa. While the ARCH LM test provides result that there is no serial correlation and the heteroskedasticity test is used reveal that there is no heteroskedasticity. This research work will be useful to international investors, domestic businessmen and academicians in the country.
Key word: Macroeconomic variables, Exchange rate, Ordinary Least Square, Conditional Heteroskedasticity.

INTRODUCTION

In the period of financial liberalization, commercialization, privatization and globalization, exchange rate plays a significant role in international trade and finance for a small open economy like Nigeria. This is because Fluctuations in the exchange rate may have a significant impact on the macroeconomic fundamentals such as interest rates, prices, wages, unemployment, and the level of output. Volatility of exchange rates put in plain words the uncertainty in international transactions both in goods and in financial assets. Exchange rates are modeled as forward-looking relative asset prices that reflect unexpected variations in relative demand and supply of domestic and foreign currencies, so exchange rate volatility replicate agents' expectations of changes in factors of money supplies, interest rates and incomes. A stable exchange rate may help enterprise and financial institutions in Evaluating the performance of investments, financing and hedging and thus reducing their operational risks. Exchange rate management has been a topical issue among economists and policy makers for a very long time. This started predominantly when the Gold standard collapsed in the 1930s and subsequent emergence of the Britton wood system of adjustment peg from the 1940s, through the adoption of flexible exchange rate given by the developing nation in 1970 and those carrying out structure reforms in the 1980 s as well as in the wake of the currency crises in developing economies in the 1990s. Flexible exchange rate is accompanied by the fluctuation of exchange rate making it the major focus in the debate due to its impact on business outcome as nations' business partners would prefer a stable exchange rate to a volatile one. It has been recognized in previous studies that maintaining a relatively stable exchange rate is important in boosting economic growth. Volatility of exchange rate induces uncertainty and risk in investment decision with destabilizing impact on the macroeconomic performance (Mahmood and Ali 2011).

Theoretically there are preplanned relationship between macroeconomic variables and exchange rate fluctuations. In this paper we will find out whether these relationships hold true in practical sense or not. It is important to know the impact of macroeconomic variables on Real exchange rate for the forecasting of exchange rate in Nigeria. This study will help Nigerians as well as foreign companies, banks, individuals, foreign Currency dealers, and investment management firms to forecast the exchange rate by using macroeconomic variables. For this research the time series secondary data from 1985 to 2017 was used. The date is obtained from National Bureau of Statistics (NBS), Central Bank of Nigeria (CBN) AND World Bank Development Indicator. From this introduction, the rest of the paper is structure as follows: section two focuses on empirical literature review while Section three relates to the methodology used. Section four dwelt extensively on empirical analysis and discussion of results. The last section presents the findings and conclusion.

EMPIRICAL LITERATURE.

Oforegbunam Thaddeus and Nnneka (2014) opined that the exchange rate is a dynamic variable, the main factors influencing its formation being the following: GDP, inflation rate, money supply, interest rate and balance of payments. Analysis of the factors influencing the exchange rate must take into

International Journal of Management Studies, Business & Entrepreneurship Research
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 5, Number 1, March 2020
http://www.casirmediapublishing.com

account their interdependence, the connection between them, which ultimately leads to currency appreciation or depreciation. Mordi (2006) studied about the concern of private sectors, about the volatility of exchange rate because the fluctuations in exchange rate effect the investments or interest of investors which become the cause of capital gain or losses. Macroeconomic variables symmetrically affect exchange rate volatility. Aliyu (2009) investigations opine that appreciations in exchange rate increase import and decrease export and vice versa. Although, appreciation and depreciation of exchange rate highly effected trade and economic growth of the exporting and importing countries. Exchange rate deprecation has a negative effect on developing countries Iyeli and Utting (2017). Honohan and Lane (2004) found that exchange rate depreciation passes through into inflation more quickly than does exchange rate appreciation. West (2003) reported that exchange rate fluctuation is helpful in future economic variables such as money, income, prices and interest rates.

Muhammad. M., Li. N., Mohammad. K. M. and Sobia.N (2018) study the 'relationship between exchange rate and macroeconomic variables for Pakistan' they used the OLS, ARCH LM Test.The result suggested that current balance is negatively significant, the inflation and Foreign direct investment is also negatively significant, but the Gross domestic product per capita is positively significant. The Trade openness shows no important relation with real exchange rate. Craig. S. Hakkio (1980) indicate that Fisher relationship show the changes in real interest rates are caused due to the change in nominal interest rates. Changes in real interest rates attract domestic and foreign investment opportunities. If U.S. real interest rate is higher than the foreign real interest rate, the market must be expecting the real exchange rate to depreciate. Changes in real interest rates were the dominant influence on nominal interest rates and the dollar.

Mukherjee (2011) analyzes how capital openness affects the behavior of inflation targeting central banks concerning exchange rate fluctuation. For this purpose, he estimates a monetary policy function where the central bank sets its interest rate with respect to inflation, the output gap, exchange rate fluctuation and capital openness, using a dynamic panel model approach for 22 inflation targeting countries. The results suggest that the response of the interest rate to exchange rate fluctuations declines with more capital openness and becomes insignificant in the upper region with limited capital openness, however, countries can maintain monetary independence and controlled exchange rate flexibility at the same time. Barkoulas, J. T., Baum, C. F., & Caglayan, M. (2000). investigate about the impact of exchange rate fluctuation on the volume and trade flow's variability. Expansion of trade is discouraged by volatility of exchange rate and minimizing its incentives. Guo (2008) carried out a comparative study and found that appreciation of exchange rate increases GDP in Russia while it reduces GDP in Japan and China. Furthermore, Mukherjee (2011) finds that inflation targeting countries are able to stabilize inflation better than non-inflation targeting countries, although the latter experience lower exchange rate volatility. Bhutt, S. K., Rehman, M. U., & Rehman, S. U. (2014) reported that interest rate and inflation rate has high effect on the fluctuation of exchange rate while gross domestic product and current account has low impact on exchange fluctuation. Jilani, S., Shaikh, S. A., & Cheema, F.-E.-A., & Shaikh, A.-U.-H. (2013) found that the there is no clear evidence of the relationship between exchange rate and economic growth because it varies from country to country. Iqbal, M., Ehsanullah, E., & Habib, A. (2011) indicate that the presence of positive impact of exchange rate volatility on GDP growth rate and trade openness. While negative impact of exchange rate volatility on foreign direct investment is found. And opined that the expectation of future appreciation or depreciation of a currency is linked closely to the expectation of future inflation in one country relative to another country. That exchange rates can help forecast fundamental macroeconomic indicators.

METHODOLOGY

The purpose of this section consists in an attempt of empirical validation on the pretended link between the macroeconomic variables and exchange rate; differently said, we will try to analyze empirically the impact of some macroeconomic variables on exchange rate in Nigeria using OLS and autoregressive Conditional Heteroskedasticity, Breusch-Godfrey Serial Correlation (LM) and Jarque-Bera normality test, following Muhammad. M., Li. N., Mohammad. K. M. & Sobia.N. (2018) to avoid the problem of serial correlation in the results because we want the equation to be useful for future forecasting and predictions. The model is specified as follows:

Model specification

The linear model is as follow:

RER = F (MS, FDI, IR, IFR, RGDP).. (1)

$RER = F(MS_t, FDI_t, IR_t, IFR_t, RGDP_t)$......-................................ (2)

The non-linear model take natural logarithmic form is as follow:

$$LogREXR_t = \alpha_0 + \alpha_1 logMS_t + \alpha_2 logFDI_t + \alpha_3 logIR_t + \alpha_4 logIFR_t + \alpha_5 RGDP_t + e_t \ldots\ldots (3)$$

Where: $REXR_t$ = Real Exchange Rate, MS_t = Money Supply, FDI_t = Foreign Direct Investment, IR_t = Interest Rate, IFR_t = Inflation Rate, $RGDP_t$ = Real Gross Domestic Product, log denotes logarithm, t denotes time period, and e_t = Error Term

α_0= is the intercept or constant term

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$ are the estimated parameters of the model

Theoretically the estimated parameters of the model are expected to have positive sign: $\alpha_0>0, \alpha_1>0, \alpha_2>0, \alpha_3>0, \alpha_4>0.\alpha_5>0$

Hypothesis

Ho = There is no significant relationship between macroeconomic variables (MS, IR, FDI, IFR, and RGDP) and real exchange rate.

H1 = There is a significant relationship between macroeconomic variables (MS, IR, FDI, IFR and RGDP) and real exchange rate.

Co-integration Analysis and Unit Root.

Co-integration is a statistical concept that deals with the analysis of the long run relationships between the non-stationary time series. The general requirement for applying the co-integration technique is to have variables of the same order of integration at hand. The examination of stationarity / non stationarity is important before doing any empirical work which is closely linked to the tests for unit roots. We use the augmented Dickey-Fuller (ADF) test which assumes that the Y series follow an AR (p) process and add p lagged difference terms of the dependent variable to the right hand side of the test regression:

$$\Delta Y_t = \beta_0 + \beta_1 t + \gamma Y_{t-1} + \Sigma\beta_i Y_{t-p} + \varepsilon_t \ldots\ldots (4)$$

The expression (3) is then used to test Ho: Y = 0; H1: Y < 0 where P = -1. Dickey and Fuller (1979) have shown that under Ho: $\gamma = 0$, the estimated t-value of the coefficient of Y obtained by using OLS in the above equation follows the τ (tau) statistic.

EMPIRICAL ANALYSIS

Descriptive Statistics of Real Exchange Rate, and FDI, RGDP, IR, IFR, MS

Table 4.0 represents the outline of descriptive statistics of all variables. The results of the descriptive statistics show the number of observations, mean, maximum, minimum values, stander deviation, Kurtosis and Jarque-Bera Test.

Table 4.0: Descriptive Statistics of the Data.

	REXR	IFR	IR	MS	FDI	RGDP
Mean	4.144926	2.739907	2.881624	14.05700	0.605333	12.43651
Median	4.785511	2.561088	2.893956	14.35000	0.640000	12.25715
Maximum	5.886096	4.287716	3.454738	17.13000	1.760000	12.86159
Minimum	1.512200	1.686399	2.332144	10.55000	-0.460000	12.10752
Std. Dev.	1.226578	0.740149	0.240382	1.948756	0.530710	0.292331
Skewness	-0.651924	0.795800	-0.181894	-0.305265	0.086746	0.281642
Kurtosis	2.087327	2.455902	3.253071	1.874912	2.763989	1.292843
Jarque-Bera	3.166239	3.536544	0.245483	2.048213	0.107251	4.039592
Probability	0.205334	0.170628	0.884492	0.359117	0.947787	0.132683
Sum	124.3478	82.19722	86.44871	421.7100	18.16000	373.0953
SumSq. Dev.	43.63034	15.88678	1.675728	110.1318	8.167947	
Observations	30	30	30	30	30	30

Source: Authors calculation using E-view 10.202

Unit Root Test (ADF)

From table 4.1 shows the result for unit root test using the popular Augmented Dickey Fuller Test (ADF) to insure the reliable of the result because the data we used for our analysis is a time series which is known to be characterize with different measures. The result indicate that the variables were not stationary at level with intercepts but were stationary after the 1st difference with intercepts at 5 per cent significant level.

International Journal of Management Studies, Business & Entrepreneurship Research
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 5, Number 1, March 2020
http://www.casirmediapublishing.com

Table 4.1: ADF Unit Root Test Results

Variables	Levels	ADF test statistic	Critical value @5%	Probability level	Order of Co integration	Remark
REXR	1st difference	-5.2079	-2.9719	0.0002	I(1)	Stationary
MS	1st difference	-4.3249	-2.9719	0.0021	I(1)	Stationary
FDI	1st difference	-9.7274	-2.9719	0.0000	I(1)	Stationary
IR	1st difference	-4.8634	-2.976263	0.0006	I(1)	Stationary
IFR	1st difference	-5.0427	-2.9719	0.0003	I(1)	Stationary
RGDP	1st difference	-4.1081	-2.9719	0.0036	I(1)	Stationary

Source: Authors calculation using E-View 10.2020

Granger Causality Test Results

The granger causality result in appendix 1, showed that real gross domestic product (RGDP) and inflation rate presented a unidirectional causality. While money supply, real GDP, interest rate, foreign direct investment and exchange rate had bidirectional relationships both in the short run and in the long run. The knowledge about the direction of causality will help policy makers to trace out policies for sustainable economic growth in Nigeria.

Johansen Co-integration

Next, we investigate the long run relationship between the variables, to test whether a long run equilibrium relationship exists among the variables of interest. The basic idea behind co-integration is that if in the long-run, two or more series move closely together, even though the series themselves are trended, the difference between them is constant. It is possible to regard these series as defining a long-run equilibrium relationship, as the difference between them is stationary. A lack of co-integration suggests that such variables have no long-run relationship: in principal they can wander arbitrarily far away from each other.

Ho: (No co-integration equation).

H1: (co-integration equation).

Decision rule: If the trace statistic is greater than the critical value, we reject Ho and accept H1 and conclude that there is cointegration equation in our model. If the trace statistics is less than critical value, we accept Ho and reject H1, and conclude that there is no cointegration equation in our model.

Table 4.2: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.847364	123.2649	95.75366	0.0002
At most 1 *	0.723456	70.63323	69.81889	0.0430
At most 2	0.521627	34.64249	47.85613	0.4670
At most 3	0.273664	13.99631	29.79707	0.8408
At most 4	0.164835	5.043534	15.49471	0.8042
At most 5	7.70E-07	2.15E-05	3.841466	0.9985

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level.

Table 4.3: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.847364	52.63162	40.07757	0.0012
At most 1 *	0.723456	35.99074	33.87687	0.0276
At most 2	0.521627	20.64618	27.58434	0.2982
At most 3	0.273664	8.952779	21.13162	0.8362
At most 4	0.164835	5.043512	14.26460	0.7363
At most 5	7.70E-07	2.15E-05	3.841466	0.9985

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

SOURCE: Authors calculation using E-view 10. 2020

From table 4.2 above the Johansen Co-integration Trace test and the Maximum Eigenvalue result indicates the presence of almost two cointegration equations in our model. we can clearly see that all the values of the trace statistic and the Maximum Eigenvalue are less than the critical values," At most 2", At most 3", "At most 4"and "At most 5" except "At most 1" we accept the alternative hypothesis and reject the null hypothesis at 5 percent level of significance and conclude that there is almost 2 cointegration equation in our model which means that there is a long run equilibrium relationship.so we go ahead to employed the use of autoregressive distributed lag model (ADLM) method to run our regression analysis on our data.

Diagnostics Tests of the Model and Result

According to Bahmani-Oskooee and Bohl (2000), the existence of cointegration does not necessarily imply that the estimated coefficients of the model are stable. One of the most important and crucial assumptions in the multiple Ordinary least square regression testing approach is that the error terms of Equation. (3) have to be serially independent and normally distributed. So, in order to check the validity and reliability of the estimation results, several diagnostics are performed. The diagnostic tests include normality test, ARCH test for heteroscedasticity, Breusch-Godfrey Serial Correlation (LM) and Jarque-Bera normality test. As illustrated in the appendices 3 below, the model passes the tests regarding (Jarque-Bera) normality (Breusch-Godfrey) serial correlation (LM), heteroscedasticity (ARCH) and specification. The results of all the diagnostics tests for the long run and short run equations are displayed in appendix 3 and table 4.2 respectively. The diagnostics tests further strengthen and confirm the reliability and validity of our estimation results. Heteroskedasticity Test, in Table 4.4 found that the value of R-squared is significant 93.18% means that there is no homoscedasticity. So, we are able to reject the null hypothesis.

Table 4.4: (ARCH) Variance Equations.

Variance Equation

C	0.107955	3.881072	0.027816	0.9778
RESID(-1)^2	0.600666	0.995816	0.603190	0.5464
GARCH(-1)	-0.030127	1.720503	-0.017511	0.9860
LOGIFR	-0.006095	0.120669	-0.050507	0.9597
LOGIR	-0.015844	0.234539	-0.067556	0.9461
LOGMS	0.001295	0.090558	0.014296	0.9886
LOGFDI	-0.027121	0.115160	-0.235508	0.8138
LOGRGDP	8.17E-05	0.457463	0.000178	0.9999

Source: Authors calculation using E-View 10. 2020

Table 4.5: Multiple Regression Model Result (OLS)

$REXR_t = 2.2308 + 0.6787MS_t - 0.1595FDI_t + 0.6169IR_t - 0.0721FR_t - 0.7285RGDP_t + e_t$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGIFR	-0.102837	0.114605	-0.897322	0.3785
LOGIR	0.633422	0.349519	1.812264	0.0825
LOGMS	0.675872	0.085777	7.879408	0.0000
LOGFDI	-0.173658	0.147987	-1.173469	0.2521
LOGRGDP	-0.728181	0.600716	-1.212189	0.2372
C	2.261823	6.978575	0.324110	0.7487
R-squared	0.931747	Mean dependent var		4.144926
Adjusted R-squared	0.917528	S.D. dependent var		1.226578
S.E. of regression	0.352248	Akaike info criterion		0.927893
Sum squared resid	2.977885	Schwarz criterion		1.208133
Log likelihood	-7.918396	Hannan-Quinn criter.		1.017544
F-statistic	65.52697	Durbin-Watson stat		1.411637
Prob(F-statistic)	0.000000			

Source: Authors calculation using E-View 10. 2020

In Table 4.5 found that the relationship between macroeconomic variables and exchange rate. The result shows that inflation rate (IFR) is negatively significant at 10% level, the foreign direct investment (FDI) is negatively significant at 5% level, Gross domestic product (RGDP) is negatively significant at level 5% and Money supply (MS) is positively significant at 1% level, interest rate (IR) is positively significant at 5% level of significant. The value of Coefficient of determination (R-squared) is 93.18% mean that 93.18% of the variation in exchange rate in Nigeria are explained by the regression equation (eqn 3). The value of F-statistics is 63.52697 is significant at the level of 5% means that the model is good fit.

FINDINGS AND CONCLUSION

The exchange rate is the one of the most important determinates of a country relative level of economic growth. Exchange rate plays a vital role for a country to level the trade which is the critical for every market economy in the world.

Nigeria is a developing country and exchange rate with US dollar is important for trade with other countries. To check the empirical relationship between exchange rate and macroeconomic variables the OLS model is used. The result shows that inflation rate (IFR) is negatively significant at 10% level, the foreign direct investment (FDI) is negatively significant at 5% level, Gross domestic product (RGDP) is negatively significant at level 5% and Money supply (MS) is positively significant at 1% level, interest rate (IR) is positively significant at 5% level of significant with real exchange rate (REXR). The INF and FDI is negatively forced the exchange rate mean that when the values of these variable is decrease the value of exchange is up but in case of RGDP is Vice versa. To control exchange rate volatility for the boost of economy must be look and valuate the importance of macroeconomic variables.

REFERENCES

Adeniran, J. O., Yusuf, S. A., & Adeyemi, O. A. (2014). The Impact of exchange rate fluctuation on the Nigerian economic growth: An empirical investigation. International Journal of Academic Research in Business and Social Sciences, 4(8), 224–233.

Aliyu, S. (2009). Impact of oil price shock and exchange rate volatility on economic growth in Nigeria: an empirical investigation. Research Journal of International Studies, (11), 4–15.

Bahmani-Oskooee, M., & Bohl, M. T. (2000). German monetary unification and the stability of the German M3 money demand function. Economics Letters, 66(2), 203–208.

Barkoulas, J. T., Baum, C. F., & Caglayan, M. (2000). Exchange rate effects on the volume and variability of trade flows. Journal of International Money and Finance, 481–496.

Bhutt, S. K., Rehman, M. U., & Rehman, S. U. (2014). Analysis of exchange rate fluctuations: A study of PKR VS USD. Journal of Managerial Sciences, 42 –60.

Chinn, M. D., & Wei, S. J. (2013). A faith-based Initiative: Does a flexible exchange rate regime really facilitate current account adjustment?. Review of Economics and Statistics, 168–184.

Engel, C., & West, K. D. (2003). Exchange rate and fundamentals. Working Paper, 1–50.

Guo, J. (2008). The Impact of oil price shock and exchange rate volatility on economic growth: a comparative analysis for Russia Japan and China. Research Journal of International Studies,
(8), 98–111.

Hakkio, C. S. (1980). Expectations and the forward exchange rate. National bureau of economic research, Working paper, 1–43.

Honohan, P., & Lane, P. R. (2004). Exchange rates and inflation under Emu: an update. IIIS Discussion Paper No., 31,1 –19.

Honohan, P., & Lane, P. R. (2014). Exchange rates and inflation under EMU: An update. Institute For International Integration Studies,1 –16.

Iqbal, M., Ehsanullah, E., & Habib, A. (2011). Exchange rate volatility and macroeconomic Variables in Pakistan. Business Management Dynamics, 11(2), 11–22.

Iyeli, I. I., & Utting, C. (2017). Exchange rate volatility and economic growth in Nigeria. International Journal of Economics, Commerce and Management, 583–595.

Jilani, S., Cheema, F.-E.-A., & Asim, M. (2010). Exploring impact of macroeconomic variables on GDP of Pakistan. Journal of Management and Social Science, 65 –73.

Jilani, S., Shaikh, S. A., & Cheema, F.-E.-A., & Shaikh, A.-U.-H. (2013). Determinants of national savings in Pakistan: an exploratory study. Asian Social Science, 9(5), 254–262.

Mahmood, I., & Ali, S. (2011). Impact of exchange rate volatility on macroeconomic performance of Pakistan. International Research Journal of Finance and Economics, 54 –65.

Mahammed. M., Li. N., Mohammad. k.m. & Sobia. N. (2018).'Impact of Macroeconomic Variables on Exchange Rates: An Evidence from Pakistan.' In Advances in Time Series Data Methods in Applied Economics Research. Springer, 325-334.

Mukherjee, S. (2011). Does the level of capital openness explain "fear of floating" amongst the inflation targeting countries? MPRA Paper No. 30289.

Mordi, C. N. (2006). Challenges of exchange rate volatility in economic management in Nigeria; in dynamics of exchange rate in Nigeria Central Bank of Nigeria Bullion. Journal of Finance and Economics, 30(3), 17–25.

Oforegbunam Thaddeus, E., & Nnneka, A. (2014). Exchange rate, inflation and interest rates relationships: An autoregressive distributed lag analysis. Journal of Economics and Development Studies, 2, 263–279.

West, K. (2003). Monetary policy and the volatility of real exchange rates in New Zealand. National Bureau of economic research working paper number 10280, 1–32.

Zamir, M., Amin, A., Uallah, S., & Khan, S. (2017). Exchange rate volatility in Pakistan and its impact on selected macroeconomic variables, 167–187 (Scientific Research Publications).

APPENDICES:

Appendix 1: **Granger Causality Test**

Period	Hypothesis(H_o)	F-statistic	Probability value	Decision
1988-2017	IFR does not granger cause FDI	2.78521	0.0826	Do not reject
	FDI does not granger cause INFR	0.56209	0.5776	Reject
1988-2017	IR does not granger cause FDI	8.03493	0.0023	Do not reject
	FDI does not granger cause IR	3.60585	0.0434	Do not reject
1988-2017	MS does not granger cause FDI	2.83855	0.0791	Do not reject
	FDI does not granger cause MS	1.28346	0.2962	Do not reject
1988-2017	EXR does not granger cause FDI	0.20523	0.8159	Reject
	FDI does not granger cause EXR	2.53490	0.1012	Do not reject
1988-2017	RGDP does not granger cause FDI	0.85988	0.4364	Do not reject
	FDI does not granger cause RGDP	0.83301	0.4474	Do not reject
1988-2017	IR does not granger cause IFR	2.24719	0.1284	Do not reject
	IFR does not granger cause IR	0.01456	0.9856	Reject
1988-2017	MS does not granger cause IFR	1.65725	0.2126	Do not reject

	IFR does not granger cause MS	0.50193	0.6118	Reject
1988-2017	EXR does not granger cause IFR	0.95621	0.3991	Do not reject
	IFR does not granger cause EXR	8.14724	0.0021	Do not reject
1988-2017	RGDP does not granger cause IFR	0.48079	0.6244	Reject
	IFR does not granger cause RGDP	0.13710	0.8726	Reject
1988-2017	MS does not granger cause IR	2.70354	0.0882	Do not Reject
	IR does not granger cause MS	0.62875	0.5422	Do not reject
1988-2017	EXR does not granger cause IR	1.20679	0.3174	Do not reject
	IR does not granger cause EXR	1.14266	0.3364	Do not reject
1988-2017	RGDP does not granger cause IR	3.52573	0.0462	Do not reject
	IR does not granger cause RGDP	0.62125	0.5460	Do not reject
1988-2017	EXR does not granger cause MS	1.99648	0.1587	Do not reject
	MS does not granger cause EXR	0.44549	0.6459	Reject
1988-2017	RGDP does not granger cause MS	0.23500	0.7924	Reject
	MS does not granger cause RGDP	2.40265	0.1128	Do not reject
1988-2017	RGDP does not granger cause EXR	0.41741	0.6636	Reject
	EXR does not granger cause RGDP	2.02883	0.1544	Do not reject

Source: Author's, using E-views. 2020

International Journal of Management Studies, Business & Entrepreneurship Research
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 5, Number 1, March 2020
http://www.casirmediapublishing.com

Appendix 2: **cointegration Results**
Included observations: 28 after adjustments
Trend assumption: Linear deterministic trend
Series: LOGFDI LOGIFR LOGIR LOGMS LOGREXR LOGRGDP
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.847364	123.2649	95.75366	0.0002
At most 1 *	0.723456	70.63323	69.81889	0.0430
At most 2	0.521627	34.64249	47.85613	0.4670
At most 3	0.273664	13.99631	29.79707	0.8408
At most 4	0.164835	5.043534	15.49471	0.8042
At most 5	7.70E-07	2.15E-05	3.841466	0.9985

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.847364	52.63162	40.07757	0.0012
At most 1 *	0.723456	35.99074	33.87687	0.0276
At most 2	0.521627	20.64618	27.58434	0.2982
At most 3	0.273664	8.952779	21.13162	0.8362
At most 4	0.164835	5.043512	14.26460	0.7363
At most 5	7.70E-07	2.15E-05	3.841466	0.9985

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LOGFDI	LOGIFR	LOGIR	LOGMS	LOGREXR	LOGRGDP
0.075486	-2.457976	2.157886	-0.855232	-0.767801	3.629655
1.689086	1.487668	-10.27000	-0.372691	1.980937	-4.895835
2.786726	-0.806271	-0.716309	-3.420726	4.078832	8.454460
-0.727079	0.604858	3.207131	-0.693173	-0.635892	6.923598
2.010997	-0.812024	0.197308	0.374731	-1.104744	4.409955
2.255923	-0.929696	3.868310	-0.338947	-0.435987	2.484351

Unrestricted Adjustment Coefficients (alpha):

D(LOGFDI)	0.010516	-0.117412	0.007695	0.083599	-0.060752
D(LOGIFR)	0.246110	-0.250687	0.226267	-0.051192	0.057378
D(LOGIR)	0.113750	0.082725	0.035706	0.010967	-0.012427
D(LOGMS)	0.047174	-0.054074	0.112183	0.033326	-0.061891
D(LOGREXR)	0.159317	-0.031130	-0.115035	-0.000742	-0.008852
D(LOGRGDP)	-0.009501	0.008144	-0.000686	-0.023751	-0.007758

1 Cointegrating Equation(s): Log likelihood 50.81703

Normalized cointegrating coefficients (standard error in parentheses)

LOGFDI	LOGIFR	LOGIR	LOGMS	LOGREXR	LOGRGDP
1.000000	-32.56208	28.58663	-11.32970	-10.17145	48.08391
	(3.96972)	(14.2441)	(3.69485)	(5.02435)	(15.4674)

Adjustment coefficients (standard error in parentheses)

D(LOGFDI)	0.000794
	(0.00489)
D(LOGIFR)	0.018578
	(0.00817)
D(LOGIR)	0.008586
	(0.00211)
D(LOGMS)	0.003561
	(0.00484)
D(LOGREXR)	0.012026
	(0.00354)

International Journal of Management Studies, Business & Entrepreneurship Research
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 5, Number 1, March 2020
http://www.casirmediapublishing.com

D(LOGRGDP)	-0.000717	
	(0.00086)	

2 Cointegrating Equation(s): Log likelihood 68.81240

Normalized cointegrating coefficients (standard error in parentheses)

LOGFDI	LOGIFR	LOGIR	LOGMS	LOGREXR	LOGRGDP
1.000000	0.000000	-5.167222	-0.513215	0.874024	-1.555834
		(0.71708)	(0.24804)	(0.31822)	(0.91531)
0.000000	1.000000	-1.036600	0.332180	0.339213	-1.524465
		(0.31304)	(0.10828)	(0.13892)	(0.39958)

Adjustment coefficients (standard error in parentheses)

D(LOGFDI)	-0.197525	-0.200517
	(0.10017)	(0.17021)
D(LOGINFR)	-0.404854	-0.977873
	(0.15643)	(0.26582)
D(LOGIR)	0.148316	-0.156527
	(0.03553)	(0.06037)
D(LOGMS)	-0.087774	-0.196396
	(0.10639)	(0.18079)
D(LOGREXR)	-0.040555	-0.437908
	(0.07852)	(0.13343)
D(LOGRGDP)	0.013039	0.035469
	(0.01906)	(0.03239)

3 Cointegrating Equation(s): Log likelihood 79.13549

Normalized cointegrating coefficients (standard error in parentheses)

LOGFDI	LOGIFR	LOGIR	LOGMS	LOGREXR	LOGRGDP
1.000000	0.000000	0.000000	-1.206081	1.644898	3.093952
			(0.25314)	(0.30798)	(0.75427)
0.000000	1.000000	0.000000	0.193184	0.493859	-0.591668
			(0.15175)	(0.18462)	(0.45215)
0.000000	0.000000	1.000000	-0.134089	0.149185	0.899862
			(0.07397)	(0.08999)	(0.22040)

Adjustment coefficients (standard error in parentheses)

D(LOGFDI)	-0.176083	-0.206721	1.223002

	(0.19302)	(0.17671)	(0.62290)
D(LOGIFR)	0.225690	-1.160305	2.943558
	(0.25248)	(0.23114)	(0.81476)
D(LOGIR)	0.247818	-0.185315	-0.629700
	(0.06336)	(0.05800)	(0.20445)
D(LOGMS)	0.224850	-0.286846	0.576774
	(0.18810)	(0.17221)	(0.60701)
D(LOGREXR)	-0.361126	-0.345158	0.745892
	(0.12603)	(0.11538)	(0.40670)
D(LOGRGDP)	0.011128	0.036022	-0.103652
	(0.03674)	(0.03364)	(0.11856)

4 Cointegrating Equation(s): Log likelihood 83.61188

Normalized cointegrating coefficients (standard error in parentheses)

LOGFDI	LOGIFR	LOGIR	LOGMS	LOGREXR	LOGRGDP
1.000000	0.000000	0.000000	0.000000	1.853215	-3.282431
				(0.54426)	(2.14267)
0.000000	1.000000	0.000000	0.000000	0.460491	0.429669
				(0.10453)	(0.41152)
0.000000	0.000000	1.000000	0.000000	0.172346	0.190954
				(0.07403)	(0.29144)
0.000000	0.000000	0.000000	1.000000	0.172722	-5.286862
				(0.43385)	(1.70801)

Adjustment coefficients (standard error in parentheses)

D(LOGFDI)	-0.236866	-0.156155	1.491115	-0.049504
	(0.18766)	(0.17109)	(0.61791)	(0.20300)
D(LOGIFR)	0.262910	-1.191269	2.779380	-0.855565
	(0.25584)	(0.23325)	(0.84244)	(0.27677)
D(LOGIR)	0.239844	-0.178682	-0.594527	-0.257855
	(0.06439)	(0.05871)	(0.21203)	(0.06966)
D(LOGMS)	0.200619	-0.266688	0.683655	-0.427041
	(0.19111)	(0.17424)	(0.62929)	(0.20674)
D(LOGREXR)	-0.360587	-0.345607	0.743511	0.269368
	(0.12913)	(0.11773)	(0.42518)	(0.13969)
D(LOGRGDP)	0.028397	0.021656	-0.179825	0.023900
	(0.03320)	(0.03027)	(0.10933)	(0.03592)

International Journal of Management Studies, Business & Entrepreneurship Research
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 5, Number 1, March 2020
http://www.casirmediapublishing.com

5 Cointegrating Equation(s): Log likelihood 86.13363

Normalized cointegrating coefficients (standard error in parentheses)

LOGFDI	LOGIFR	LOGIR	LOGMS	LOGREXR	LOGRGDP
1.000000	0.000000	0.000000	0.000000	0.000000	2.128444
					(0.81273)
0.000000	1.000000	0.000000	0.000000	0.000000	1.774176
					(0.61052)
0.000000	0.000000	1.000000	0.000000	0.000000	0.694155
					(0.12052)
0.000000	0.000000	0.000000	1.000000	0.000000	-4.782561
					(1.03554)
0.000000	0.000000	0.000000	0.000000	1.000000	-2.919724
					(0.88990)

Adjustment coefficients (standard error in parentheses)

D(LOGFDI)	-0.359038	-0.106823	1.479128	-0.072270	-0.195320
	(0.21255)	(0.17181)	(0.59968)	(0.19804)	(0.26021)
D(LOGIFR)	0.378296	-1.237861	2.790701	-0.834064	0.206511
	(0.29443)	(0.23800)	(0.83067)	(0.27432)	(0.36044)
D(LOGIR)	0.214854	-0.168591	-0.596979	-0.262512	0.228928
	(0.07438)	(0.06013)	(0.20985)	(0.06930)	(0.09106)
D(LOGMS)	0.076156	-0.216431	0.671444	-0.450233	0.361422
	(0.21646)	(0.17498)	(0.61071)	(0.20168)	(0.26499)
D(LOGREXR)	-0.378389	-0.338419	0.741765	0.266050	-0.642948
	(0.15053)	(0.12168)	(0.42470)	(0.14025)	(0.18428)
D(LOGRGDP)	0.012796	0.027956	-0.181355	0.020993	0.044304
	(0.03816)	(0.03085)	(0.10767)	(0.03556)	(0.04672)

Source: Authors calculation using E-views.2020

Appendix 3: ARCH Test for Hetroskedasticity, Normality and Serial Correlation (LM) Test.

Dependent Variable: LOGREXR
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Date: 02/05/20 Time: 18:37
Sample: 1988 2017
Included observations: 30
Failure to improve likelihood (non-zero gradients) after 45 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
GARCH = C(7) + C(8)*RESID(-1)^2 + C(9)*GARCH(-1) + C(10)*LOGIFR + C(11)*LOGIR + C(12)*LOGMS + C(13)*LOGFDI + C(14)*LOGRGDP

Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOGIFR	-0.072122	0.140538	-0.513182	0.6078
LOGIR	0.616890	0.743746	0.829436	0.4069
LOGMS	0.678667	0.134897	5.030993	0.0000
LOGFDI	-0.159483	0.212246	-0.751409	0.4524
LOGRGDP	-0.728527	0.998912	-0.729320	0.4658
C	2.230793	12.20233	0.182817	0.8549
	Variance Equation			
C	0.107955	3.881072	0.027816	0.9778
RESID(-1)^2	0.600666	0.995816	0.603190	0.5464
GARCH(-1)	-0.030127	1.720503	-0.017511	0.9860
LOGIFR	-0.006095	0.120669	-0.050507	0.9597
LOGIR	-0.015844	0.234539	-0.067556	0.9461
LOGMS	0.001295	0.090558	0.014296	0.9886
LOGFDI	-0.027121	0.115160	-0.235508	0.8138
LOGRGDP	8.17E-05	0.457463	0.000178	0.9999

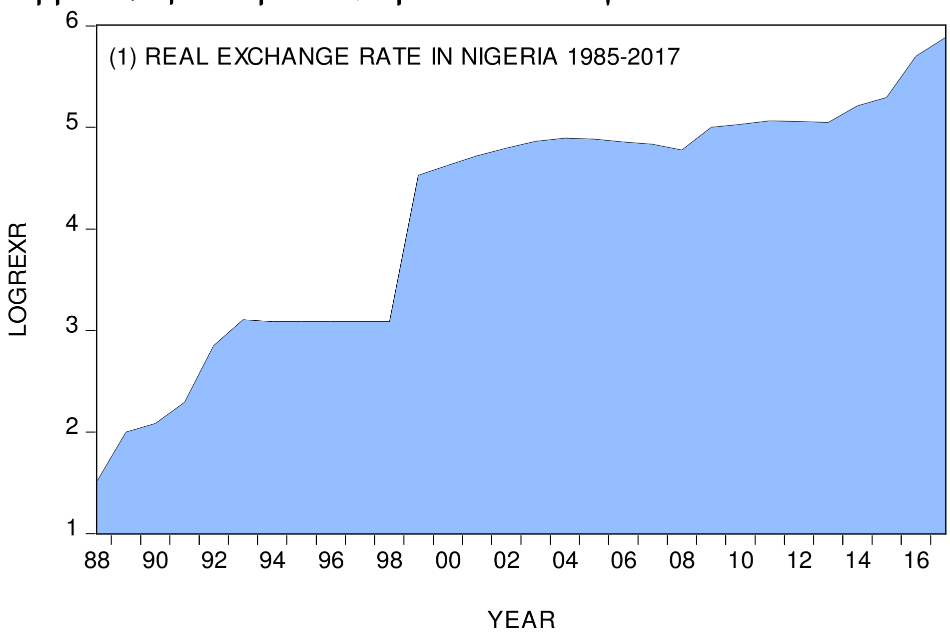
R-squared	0.929731	Mean dependent var	4.144926
Adjusted R-squared	0.915092	S.D. dependent var	1.226578
S.E. of regression	0.357413	Akaike info criterion	1.085606
Sum squared resid	3.065856	Schwarz criterion	1.739498

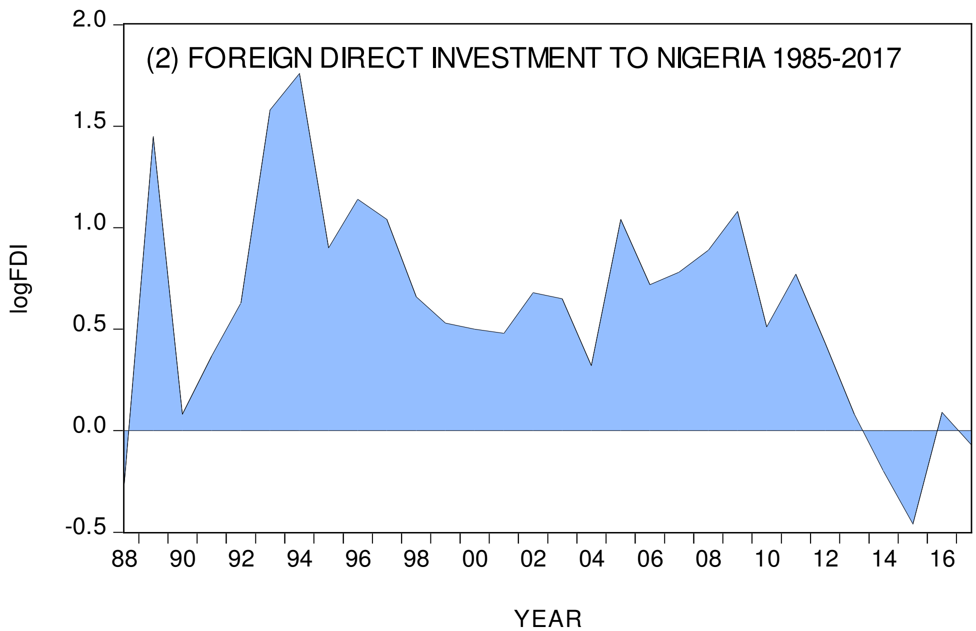
International Journal of Management Studies, Business & Entrepreneurship Research
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 5, Number 1, March 2020
http://www.casirmediapublishing.com

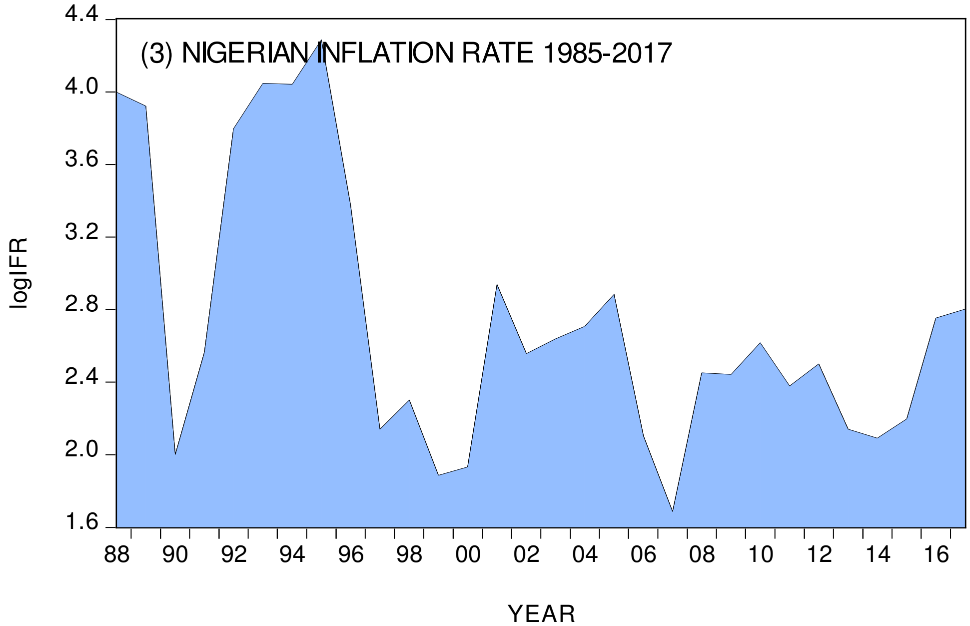
Log likelihood	-2.284092	Hannan-Quinn criter.	1.294792
Durbin-Watson stat	1.334623		

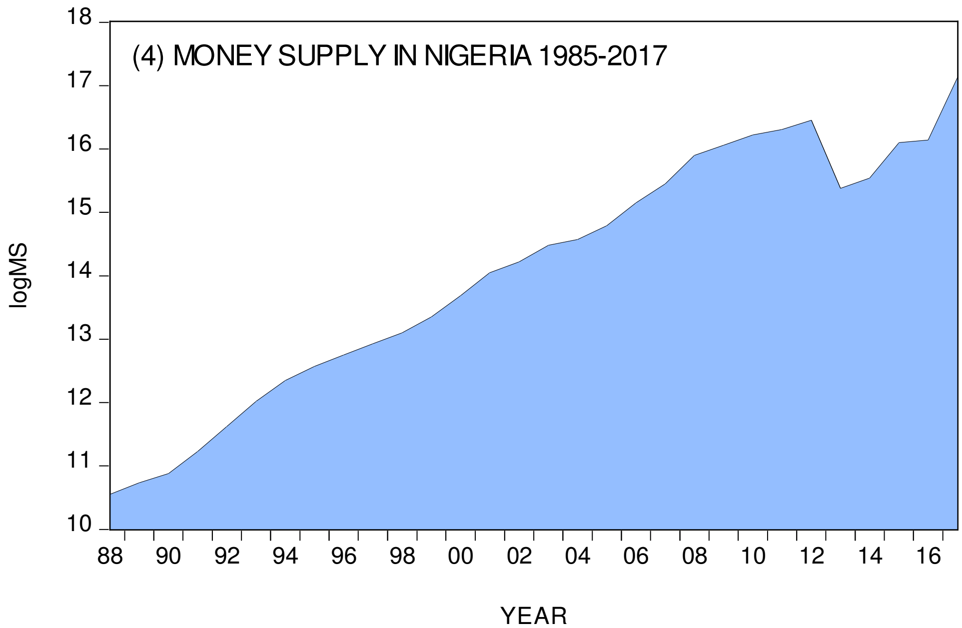
Source: Authors calculation using E-view 10. 2020

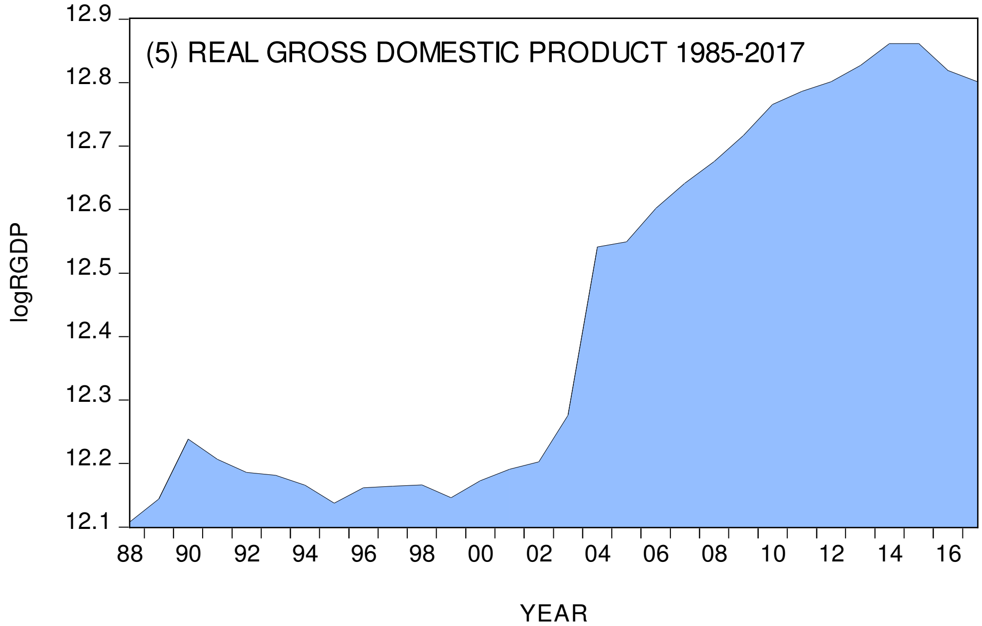
Appendix 4: Graphical Representation of Data



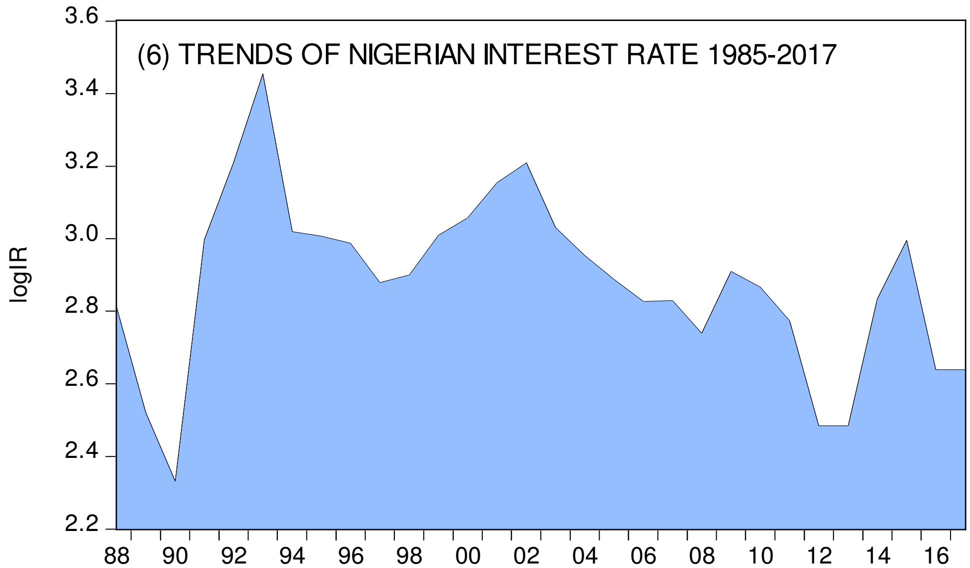



(3) NIGERIAN INFLATION RATE 1985-2017
logIFR
4.4
4.0
3.6
3.2
2.8
2.4
2.0
1.6
88 90 92 94 96 98 00 02 04 06 08 10 12 14 16
YEAR


(4) MONEY SUPPLY IN NIGERIA 1985-2017
logMS
18
17
16
15
14
13
12
11
10
88 90 92 94 96 98 00 02 04 06 08 10 12 14 16
YEAR



SSSS



Source: Authors plots using E-View10 2020