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Time Series Analysis of Nigeria External (Foreign) Reserves

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Abstract

Economy of a country can absorb shock and as well boost confidence through external reserves. Hence, external reserves play an important role to the extent that it helps in stabilizing the country's economy. This study focuses on modeling the Nigeria external reserves using time series technique. 30-year data were extracted from the Central Bank of Nigeria (CBN) bulletin from 1990 – 2019. Some economic tools used to diagonize the data are Augmented Dickey Fuller (ADF) test, unit root tests Kwaitkowshi – philips – Schmiot – Shin test in order to ascertain the stationary of the data. Meanwhile, Auto Regression Integrated Moving Average (ARIMA) model was used as model for prediction whereby Akaike Information Criterion (AIC) and Hannan-Quinn Information Criterion (HQIC) were used as model diagnostic checking. At original level, the data showed an upward trend and found out to be non-stationary. When further examined using the diagnostic economic tools, at first difference the data were found to maintain a state of equilibrium. Also, model diagnostic checking revealed that ARIMA (2,1,7) was found to be the appropriate optimal model and thereby used for forecast for the next five years. Hence, the forecasted values revealed that the Nigeria external reserves will continue to increase steadily. Consequently, government should put in place legal policies that will enhance, increase accumulation and proper management of external reserves.

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Keywords: External reserve, Augmented Dickey-Fuller, Unit root, Stationarity, Forecast

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1. Introduction

International Monetary Fund (IMF) refers foreign reserves as available assets owned and controlled by the country's monetary authorities. In other words, it means the currency being deposited by the apex financial institution so

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as to meet the purpose of maintain the stability of the country's currency successfully. International reserves play a vital role in the development of the country's economy such as meeting the balance of payments financing needs, intervention in exchange market which may likely to distort the currency exchange rate and at the same time maintain the confidence in the currency of the country. Part of the external reserves includes the following; international currencies, gold reserves, special drawing rights and other assets inform of international currencies [1]. External reserves are very important most especially for protection against any financial challenges which may likely to occur. The financial strength of country could be in jeopardy if external reserves are not well stabilized and balanced [2].

An empirical study carried out by [3] affirmed the important determinant of a country to maintain stability against financial challenges is that external reserves should be well monitored by the government and that if external reserves are highly reserved, the economy of such country will develop agility against any financial crisis. Therefore, there will be volatility in the inflow of international capital. Yuguda [4], Soludo [5] and Nda [6] claimed that, in the nation's policies and creditworthiness, the confidence of international community is well built. In the same vein, through foreign reserves, the confidence of a nation is guaranteed to domestic borrowers so as to meet international debt – servicing and thereby increase its credit rating [7]. An integral function of foreign reserves is the ability for a country to repay foreign debt and at the same time defend her currency from being devaluated. [8].

A critical observation was noted by [9] that external reserve plays an important or positive role in the country's economy. Therefore, more funds are made available for investors and employment opportunities are made available for job seekers; thereby increase the output and consumptions get promoted. Furthermore, through availability of external reserves, standard of living of the citizenry gets really improved. One of the main source of foreign exchange is crude oil which has being the "back bone" of Nigeria economy since 1970's where by the Gross Domestic Product (GDP) the country has been deriving her strength for survival. Therefore, according to [10] affirmed that, there would be vulnerability of some dependent oil product if peradventure there is an increase in oil prices. Several models have been proposed by many researchers based on time series technique for external reserves.

Iwueze et al. [11], employed data on Nigeria external reserves from 1999 – 2008 using ARIMA (2,1,2) after the log – transformation of the data. With this model, they forecasted the Nigeria external reserves and found out that the reserves will be on the increase for some years to come. Using descriptive time series technique, Box – Jenkins (ARIMA) model [12], modelled Nigeria external reserves from 1960 – 2010. In their analysis, the untransformed data were subjected to several models, such as exponential and linear trend and later found out that the best model that suit the data is linear trend. The results revealed that ARIMA (1,1,5) was found to be the best fitting model. In order to predict the Nigeria's external reserves, [13] used ARIMA (1,2,2) to model and predict Nigeria external reserves using monthly 50 years data from 1960 to 2008. Sequel to non-stationarity of the data, they took the log-transformation of the data and thereby affirmed that the Nigeria external reserves would be on the increase and concluded that the fairness, equity and justice should be exercised by the Nigeria government so as to have better economy through foreign exchange. With the aids of ARIMA (5,1,0), Nigeria's external reserves were modelled and forecasted by [14] using R-statistical packages after model diagnosis using AIC and BIC criterion. A one-year forecast was made and discovered that the forecasted values of Nigeria external reserves remain on the increase when compared with observed values collected from 1960 to 2013.

Likewise ARIMA (4,1,0) model was suggested by [15] as best model for Nigeria external reserves after model diagnostic statistics AIC and BIC was performed. The analysis was done using E–view softwares using Nigeria 34 years data on Nigeria external reserves from 1981 – 2014. In order to monitor the growth of Nigeria external reserves, [16] employed time series technique to analyse the monthly data extracted from CBN using ARIMA models. Their results revealed that ARIMA (2, 1, 0) was best fit for the transformed data and recommended for forecast. In the same vein, [17] empirically investigated the Nigeria external reserves from 1960-2018 using Box-Jenkins ARIMA models, the results of diagnostic check revealed that ARIMA (1, 1, 2) was found appropriate based on some criterion such Akaike Information Criterion (AIC) and Log likelihood.

Doguwa and Alade, [18], proposed, compared and contrasted three models in application to Nigeria's external reserves which includes; Seasonal Autoregressive Integrated Moving Average (SARIMA), Seasonal Autoregressive

Integrated Moving Average with independent variable (SARIMA-X) and an Autoregressive distributed Lag (ARDL) processes with already existing ones such as ARIMA. They were able to deduced that SARIMA model should employed for forecast sequel to its outperformance among all other models considered in the study. ARIMA (4, 1, 0) was proposed by [19] as the best model in predicting the Nigeria external reserves after subjecting it to some diagnostic tests such as Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC).

In the literature, many authors usually employ only Augmented Dickey Fuller (ADF) test to ascertain the stationarity of a time series data and employ Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) as model diagnostic tools whereas some other diagnostics tools used to be neglected. However, this study considered some other diagnostics tools such as unit root tests, Kwaitkowshi – philips – Schmiot – Shin test and and Hannan-Quinn Information Criterion (HQIC) for test of stationarity and model diagnostic respectively for data analysis.

2. Methodology

A sequence of information or data taken at successive equally spaced interval is known as time series. Time series data can either be discrete or continuous such as amount of income received per day, weekly, monthly or yearly, amount of rainfall recorded in a particular area and so on. Using line charts, time series is usually and frequently plotted. Also, it is very useful in different fields such as statistics, Engineering, finance, accounting, Econometrics, weather forecast among others. It comprises of four major components which include; Trend, seasonal, cyclical and Irregular. Meanwhile, it has two major models which include additive and multiplicative models. However, time series approach was employed in this study in order to examine the position of the Nigeria external reserves based on data extracted from the Central Bank of Nigeria (CBN) bulletin [20] for complete 30 years, spanning from January 1990 to December 2019 and to predict its implication on Nigeria economy. Stationarity of the data was ascertained using the following statistics; Augmented Dickey-Fuller (ADF), Unit Root Tests and Kwiatkowski-Philips-Schmidt-Shin Test (KPSS). Also, the data were differenced once, since the data were not stationary at the ordinary level. To determine the proper model for the series, Autocorrelation and Partial Autocorrelation Function (ACF and PACF) were performed and their plots were displayed at different lags. Meanwhile, box-jenkins ARIMA model was used for future forecasts whereby the model was subjected to the diagnostic checking which include; the Akaike's Information Criterion (AIC) and Hannah Quinn Criterion (HQIC).

2.1. Model Selection

In time series analysis, in order to ascertain the validity and appropriate model to use for prediction, some of the most commonly used model selection or information criterions are; Bayesian information Criterion (BIC) and Akaike Information Criterion (AIC).

2.2. Akaike Information Criterion (AIC)

This is the type of model selection that offers an estimate of the relative information lost when a particular model is employed to represent the process that generated the information. At the same time, it estimates how quality of each model is in a given series of models. Therefore, equation (1) gives the mathematical expression of (AIC).

$$\mathrm{AIC} = 2k - 2\ln(L), \tag{1}$$

where L is the maximized value of the maximum likelihood function of the model, $L = Yt/\hat{\Theta}$, $\hat{\Theta}$ is the parameter that maximizes the function, Yt is the observation, n is the number of observations and k is the number of parameters.

2.3. Bayesian Information Criterion (BIC)

Another criterion for model selection in time series analysis among finite set of models that is based on the likelihood function, very close and related to the Akaike information criterion (AIC) is Bayesian information criterion (BIC) or Schwarz criterion (also SBC, SBIC). It is stricter in penalizing loss of degree of freedom. The statistic is defined as:

$$BIC = \ln(n)k - 2\ln L. \tag{2}$$

2.4. Hannan–Quinn Information Criterion (HQIC)

The measure of the goodness of fit of statistical model and used as a criterion for model selection among a finite set of models is the Hannan–Quinn information criterion (HQIC). It is related to Akaike's information criterion. The HQIC is given as in equation (3):

$$\mathrm{HQIC} = -2L_{\max} + 2k\ln(\ln(n)), \tag{3}$$

where $L_{\max}$ is the log-likelihood, n is the number of observations and k is the number of parameters.

3. Analysis of Data

This section consists of the analysis of the data and its interpretations. The data collected are a time series data of the Nigeria External (Foreign) Reserve extracted from the Central Bank of Nigeria (CBN) bulletin for complete 30 years, spanning from January 1990 to December 2019. The analysis was done using Gretel software.

Interpretation

: Figure 1 indicates the time plot and it can be seen that there is an upward trend in the reserves. It also shows that the data are not stationary at its original level which means it is not stable over time. For the first 6 years (1990-1996) the reserve was found to be oscillating, and slowly increased for the next 6 years (1997-2002), after a dip in 2002 the reserve increased steadily from 2004 to 2008 where a dip was experienced till 2011, it increased for the next 2 years (2011-2013) and decreased for the next 3 years (2013-2016), an increase from 2016 to 2018 was observed and a dip is being observed in 2019.

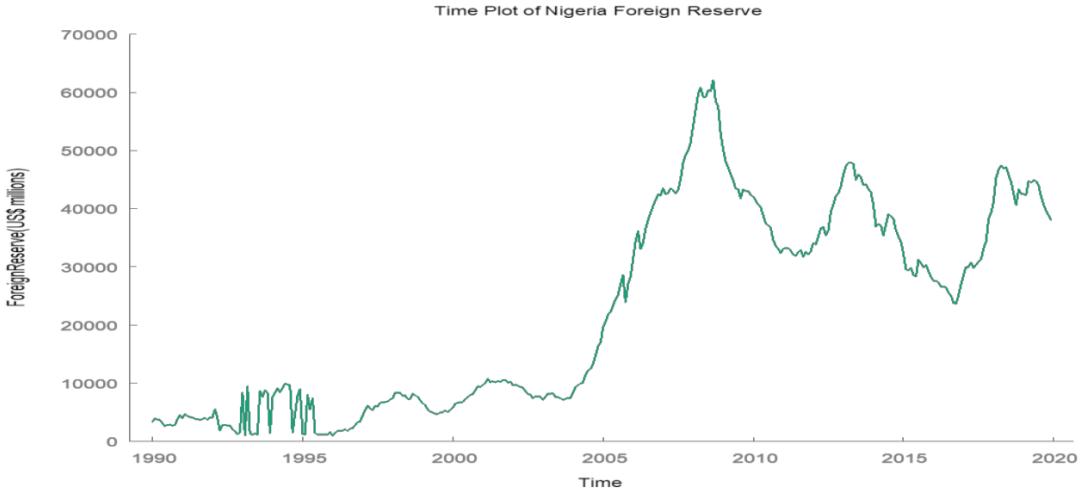


Figure 1. Time plot at original level of Nigeria External (Foreign) Reserve (US$ millions) from 1990 January to 2019 December

Interpretation:

Figure 2 is the ACF and PACF plots which show that the data are not stationary at the original level as the spikes of the lags in the Autocorrelation function plot (ACF) are slowly decaying and the spike from the Partial Autocorrelation function cuts off at the first lag.

3.1. Test for Stationarity

Interpretation:

The results in Tables 1 and 2 for the two tests show that a unit root is present in the series since p-value>0.05, therefore the data are not stationary at original level. Since the data are not stationary at its original level hence the method of differencing was applied in order to make it stationary.

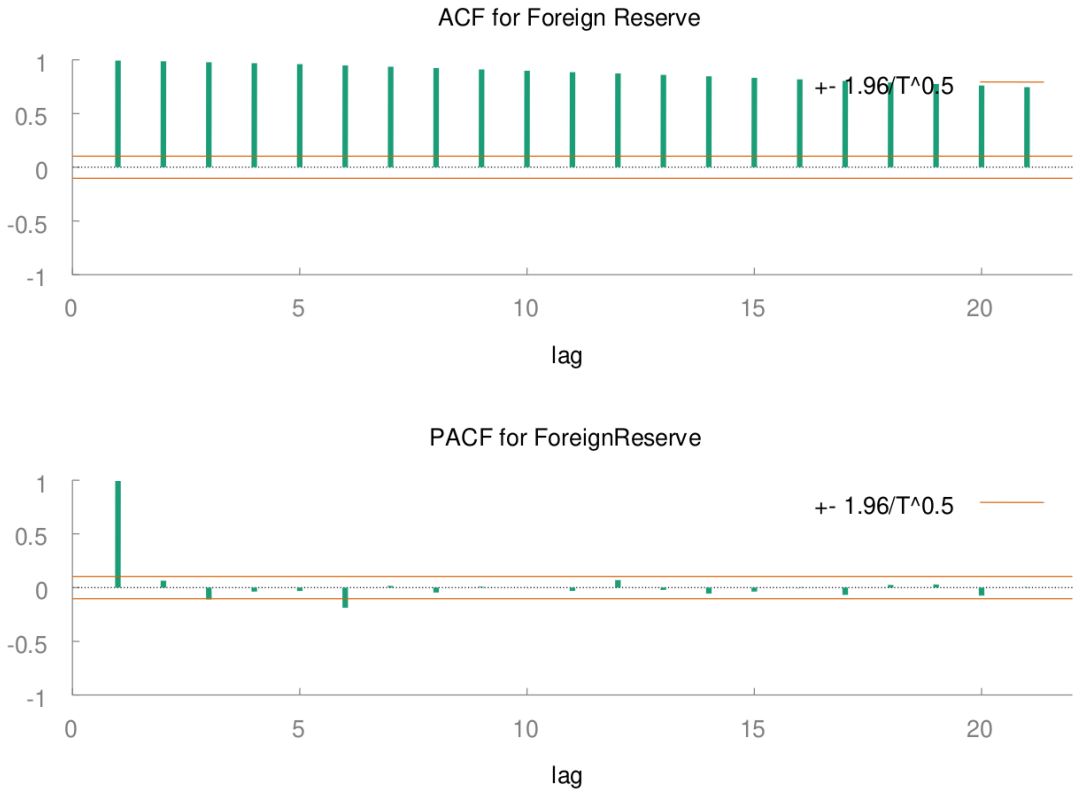


Figure 2. ACF and PACF plots at original level of Nigeria External (Foreign) Reserve (US$ millions) from 1990 January to 2019 December

Table 1. Result for the Augmented Dickey- Fuller (ADF) test at original level of Nigeria External (Foreign) Reserve (US$ millions) from 1990 January to 2019 December

Variable Status	Variable Name	Statistics	With constant	Without constant	With constant and trend
Original	External (Foreign) Reserve	Value p-value	-1.49361 (0.5371)	-0.362885 (0.5543)	-2.19533 (0.4917)

Table 2. Result for the Kwiatkowski-Philips-Schmidt-Shin Test (KPSS test) at original level of Nigeria External (Foreign) Reserve (US$ millions) from 1990 January to 2019 December

Variable Status	Variable Name	Statistics	Without trend	With trend
Original	External (Foreign) Reserve	Value p-value	1.37711 (0.0100)	0.154146 (0.0460)

Interpretation:

Figure 3 is the time plot after the first difference. It shows that the data is stationary as trend no longer exist in the series and it also indicated that the data is now stable over time. Likewise, Tables 3 and 4 indicate that a unit root is not present in the series anymore as p-value of test statistics is less than 0.05, therefore the data are now stationary at first difference and to justify this is Figure 4.

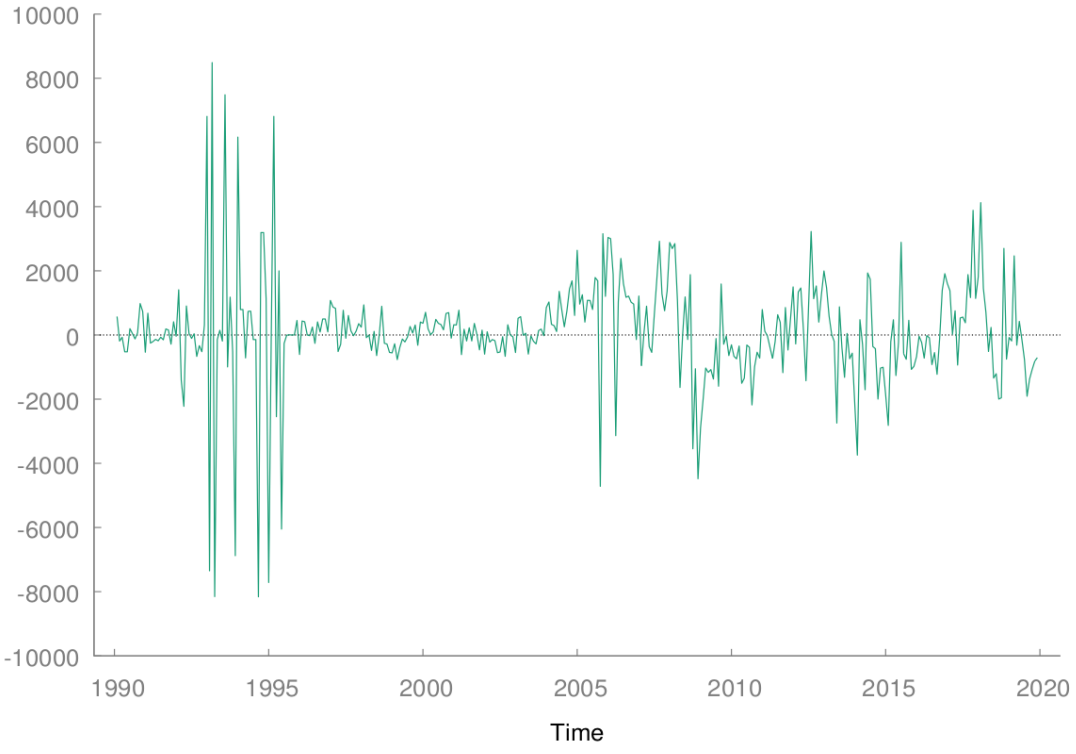


Figure 3. Time plot at first difference of Nigeria External (Foreign) Reserve (US$ millions) from 1990 January to 2019 December

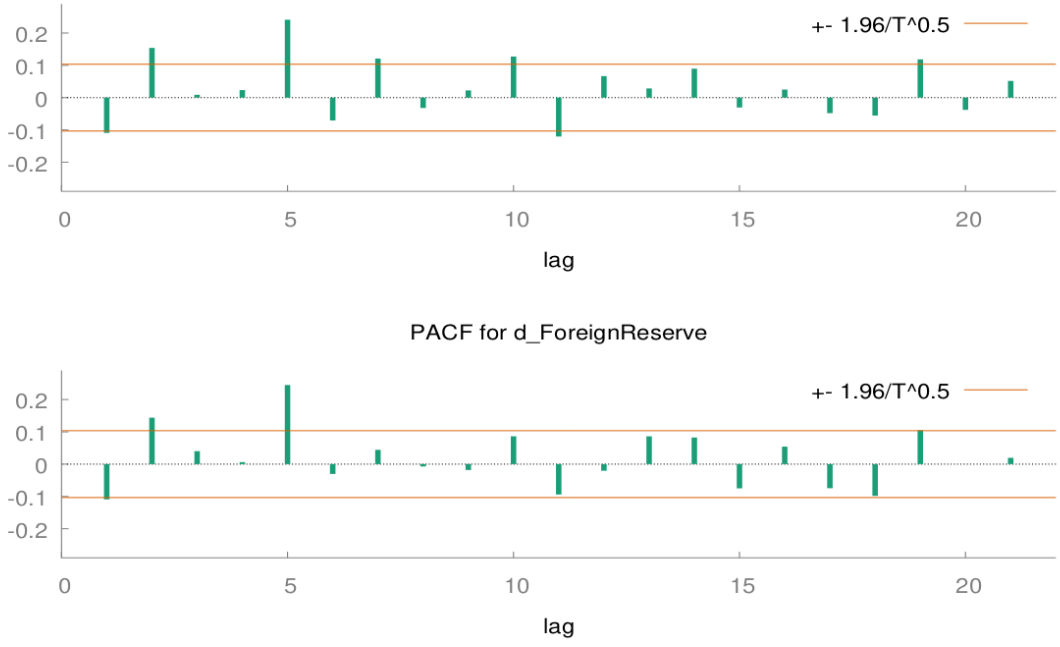


Figure 4. ACF and PACF plots at first difference of Nigeria External (Foreign) Reserve (US$ millions) from 1990 January to 2019 December

Table 3. Result for the Augmented Dickey- Fuller (ADF) test at first differencing of Nigeria External

Variable Status	Variable Name	Statistics	With constant	Without constant	With constant and trend
First difference	External (Foreign) Reserve	Value p-value	-5.96584 (1.447e-007)	-5.92858 (6.782e-009)	-5.95784 (1.468e-006)

Table 4. Result for the Kwiatkowski-Philips-Schmidt-Shin Test (KPSS test) at first differencing of Nigeria External (Foreign) Reserve (US$ millions) from 1990 January to 2019 December

Variable Status	Variable Name	Statistics	Without trend	With trend
First difference	External (Foreign) Reserve	Value p-value	0.0666769 (0.1000)	0.0643617 (0.1000)

3.2. Model Identification

Table 5. Result for Model Identification ARIMA (p,d,q).

S/N	Model	Akaike Criterion	Schwarz-Criterion	Hannah-Quinn
1	ARIMA (1,1,1)	6376.865	6392.399	6383.042
2	ARIMA (1,1,2)	6374.16	6393.576	6381.881
3	ARIMA (1,1,3)	6375.992	6399.292	6385.258
4	ARIMA (1,1,4)	6366.664	6393.847	6377.473
5	ARIMA (1,1,5)	6363.962	6395.029	6376.316
6	ARIMA (1,1,6)	6365.441	6400.391	6379.339
7	ARIMA (1,1,7)	6363.275	6402.109	6378.718
8	ARIMA (2,1,1)	6369.029	6388.446	6376.751
9	ARIMA (2,1,2)	6362.038	6385.338	6372.304
10	ARIMA (2,1,3)	6363.738	6390.922	6374.548
11	ARIMA (2,1,4)	6367.79	6398.857	6380.144
12	ARIMA (2,1,5)	6363.926	6398.876	6377.824
13	ARIMA (2,1,6)	6365.247	6404.08	6380.689
14	ARIMA (2,1,7)	6355.289	6398.006	6372.276
15	ARIMA (3,1,1)	6370.716	6394.016	6379.981
16	ARIMA (3,1,2)	6371.906	6399.089	6382.715
17	ARIMA (3,1,3)	6360.108	6391.175	6372.462
18	ARIMA (3,1,4)	6360.715	6395.665	6374.613
19	ARIMA (3,1,5)	6358.237	6397.07	6373.679
20	ARIMA (3,1,6)	6360.715	6402.902	6377.172
21	ARIMA (3,1,7)	6355.818	6402.418	6374.349

Interpretation

: The results in Table 5 show the test of various ARIMA models to determine the best ARIMA model to use for the data using the selected criterions, Akaike Information criterions, Schwarz criterions and Hannah- Quinn criterion. The model in bold indicates the best model, that is ARIMA (2,1,7) has the least value for the Akaike criterion and the least value for the Hannah-quinn criterion. Hence, from the table the best model is ARIMA (2,1,7) as highlighted since it satisfies two of the three criterions considered.

3.3. Model Estimation

Table 6. Result of the estimated parameter of ARIMA (2,1,7)

	Coefficient	Standard error	Z- test	p-Value
Constant	95.5388	115.826	0.8248	0.4095
phi_1	-0.923983	0.142753	-6.473	9.63E-11
phi_2	-0.691207	0.107409	-6.435	1.23E-10
theta_1	0.848343	0.138955	6.105	1.03E-09
theta_2	0.779651	0.117428	6.639	3.15E-11
theta_3	0.0381835	0.0803449	0.4752	0.6346
theta_4	0.136215	0.0808053	1.686	0.0919
theta_5	0.239247	0.0767415	3.118	0.0018
theta_6	0.226053	0.0716545	3.155	0.0016
theta_7	0.249113	0.0588306	4.234	2.29E-05

The following equation indicates the model used for forecast:

$$Y_{\mathrm{t}} = 95.5388 - 0.923983yt_{\text{-}1} - 0.691207yt_{\text{-}2} + 0.848343e_{\mathrm{t\text{-}1}} + 0.779651e_{\mathrm{t\text{-}2}} + 0.0381835e_{\mathrm{t\text{-}3}} + 0.136215e_{\mathrm{t\text{-}4}} + 0.239247e_{\mathrm{t\text{-}5}} + 0.226053 \quad (4)$$

3.4. Model Diagnostic Checking

The following tests were applied to the residual: Test for Auto correlation and Test for Partial Auto correlation function to check the model adequacy.

Table 7. Result for residual autocorrelation function

LAG	ACF	PACF	Q-stat	p-value
1	-0.0048	-0.0048	0.0583	0.124
2	-0.0064	-0.0064	0.0530	0.126
3	0.0119	0.0118	0.0742	0.128
4	0.0037	0.0037	0.0789	0.122
5	0.0103	0.0105	0.1174	0.127
6	-0.0203	-0.0203	0.2690	0.129
7	-0.0034	-0.0035	0.2732	0.131
8	0.0343	0.0338	0.7069	0.135
9	0.03	0.0307	1.0396	0.139
10	0.0572	0.0582	2.2549	0.133
11	-0.0653	-0.065	3.8443	0.146
12	0.045	0.0442	4.6004	0.204
13	0.0332	0.0305	5.0135	0.286
14	0.0729	0.0768	7.0112	0.220
15	-0.0381	-0.0382	7.5584	0.272
16	0.008	0.0106	7.5827	0.371
17	-0.0361	-0.0449	8.0758	0.426
18	-0.0526	-0.0565	9.1291	0.425
19	0.0876	0.09	12.0565	0.281
20	0.0427	0.0461	12.7531	0.310
21	0.0127	0.0179	12.8149	0.383

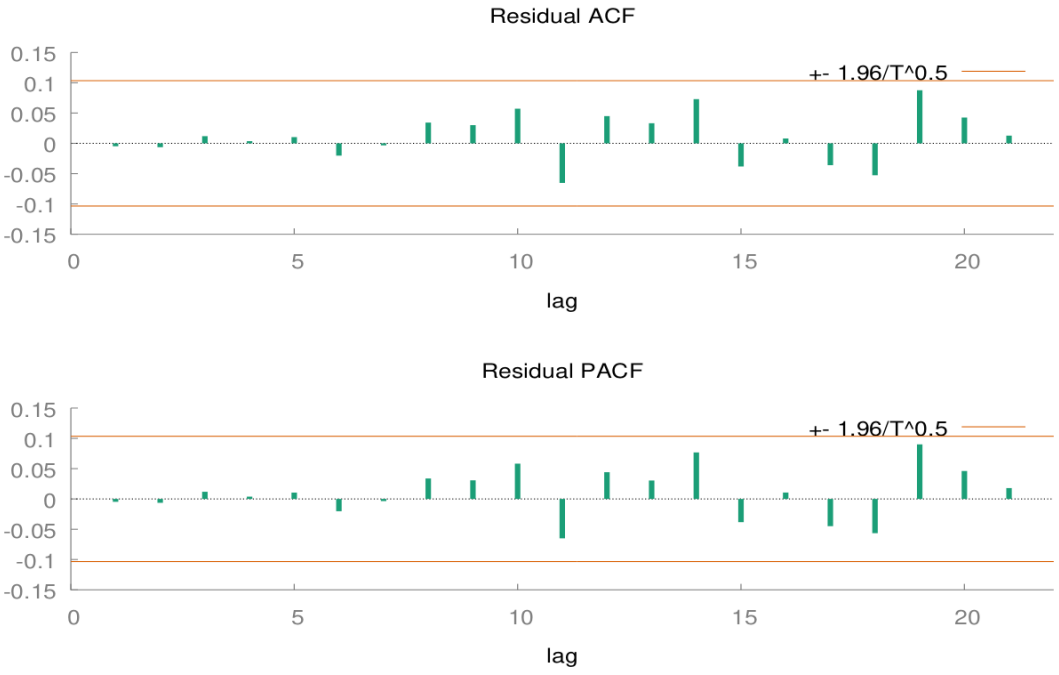


Figure 5. Residual ACF and PACF plot of the best ARIMA model

Interpretation:

Table 6 indicates the estimated parameters for the chosen model ARIMA (2, 1, 7) and fitted in equation (4). Meanwhile, results for ACF and PACF at different lags were displayed in Table 7. From Table 7 above it can be seen that the Q-stat and P-value at different lags were greater than the exact P-value (0.05) which indicates that from lag 1 to lag 21, there is no serial correlation which makes the model considered adequate and Figure 5 is the residual ACF and PACF. The report revealed that the errors are normally distributed and their values at lag 1 to lag 21 hover around zero line this made the model valid and adequate.

3.5. Forecasting

After subjecting the model ARIMA (2,1,7) to diagnostic testing, it was confirmed that the model is adequate, an output sample forecast for the next 5 years was made.

Table 8: Result for the forecast of the Nigeria External (Foreign) Reserve (US$ millions) for the next 5 years

Time	Forecast	Standard error	95% interval (LCL-HCL)
2020:01	37435.87	1637.322	(34226.78 - 40644.96)
2020:02	36890.85	2229.671	(32520.78 - 41260.93)
2020:03	36814.98	2848.503	(31232.02 - 42397.94)
2020:04	36680.04	3307.681	(30197.10 - 43162.98)
2020:05	36624.43	3770.335	(29234.71 - 44014.15)
2020:06	36753.52	4338.273	(28250.66 - 45256.37)
2020:07	36733.03	4827.077	(27272.13 - 46193.92)
2020:08	36912.59	5355.277	(26416.44 - 47408.74)

Table 8 (contd)

Time	Forecast	Standard error	95% interval (LCL-HCL)
2020:09	37010.69	5771.601	(25698.56 - 48322.82)
2020:10	37045.78	6164.816	(24962.97 - 49128.60)
2020:11	37195.40	6569.009	(24320.38 - 50070.42)
2020:12	37282.75	6916.408	(23726.84 - 50838.66)
2021:01	37348.48	7254.878	(23129.18 - 51567.78)
2021:02	37477.22	7592.358	(22596.48 - 52357.97)
2021:03	37562.69	7898.041	(22082.81 - 53042.56)
2021:04	37644.58	8198.801	(21575.23 - 53713.94)
2021:05	37759.69	8494.307	(21111.16 - 54408.23)
2021:06	37846.58	9043.527	(20656.01 - 55037.14)
2021:07	37936.58	9043.527	(20211.60 - 55661.57)
2021:08	38043.22	9309.968	(19796.01 - 56290.42)
2021:09	38132.33	9564.421	(19386.41 - 56878.25)
2021:10	38226.14	9815.243	(18988.61 - 57463.66)
2021:11	38327.72	10060.142	(18610.20 - 58045.23)
2021:12	38418.87	10296.967	(18237.19 - 58600.56)
2022:01	38514.29	10530.285	(17875.31 - 59153.27)
2022:02	38612.97	10758.389	(17526.91 - 59699.02)
2022:03	38705.69	10980.691	(17183.93 - 60227.45)
2022:04	38801.66	11199.648	(16850.75 - 60752.57)
2022:05	38898.75	11414.146	(16527.43 - 61270.06)
2022:06	38992.56	11624.212	(16209.52 - 61775.59)
2022:07	39088.62	11831.153	(15899.99 - 62277.26)
2022:08	39184.87	12034.304	(15598.07 - 62771.67)
2022:09	39279.39	12233.888	(15301.41 - 63257.37)
2022:10	39375.38	12430.600	(15011.85 - 63738.91)
2022:11	39471.21	12624.075	(14728.47 - 64213.94)
2022:12	39566.17	12814.564	(14450.08 - 64682.25)
2023:01	39662.04	13002.437	(14177.73 - 65146.35)
2023:02	39757.67	13187.519	(13910.61 - 65604.73)
2023:03	39852.89	13370.026	(13648.13 - 66057.66)
2023:04	39948.66	13550.164	(13390.83 - 66506.50)
2023:05	40044.21	13727.866	(13138.08 - 66950.33)
2023:06	40139.58	13903.303	(12889.61 - 67389.56)
2023:07	40235.27	14076.598	(12645.64 - 67824.89)
2023:08	40330.78	14247.740	(12405.73 - 68255.84)
2023:09	40426.24	14416.863	(12169.71 - 68682.77)
2023:10	40521.87	14584.043	(11937.67 - 69106.07)
2023:11	40617.38	14749.304	(11709.28 - 69525.49)
2023:12	40712.88	14912.743	(11484.44 - 69941.32)
2024:01	40808.48	15074.418	(11263.16 - 70353.79)
2024:02	40903.99	15234.364	(11045.19 - 70762.80)
2024:03	40999.51	15392.655	(10830.47 - 71168.56)
2024:04	41095.08	15549.338	(10618.94 - 71571.23)
2024:05	41190.61	15704.450	(10410.45 - 71970.76)
2024:06	41286.14	15858.049	(10204.93 - 72367.34)
2024:07	41381.69	16010.176	(10002.33 - 72761.06)
2024:08	41477.22	16160.867	(9802.50 - 73151.94)
2024:09	41572.76	16310.169	(9605.42 - 73540.10)

Table 8 (contd)

Time	Forecast	Standard error	95% interval (LCL-HCL)
2024:10	41668.31	16458.116	(9410.99 - 73925.62)
2024:11	41763.84	16604.743	(9219.14 - 74308.54)
2024:12	41859.38	16750.089	(9029.81 - 74688.95)

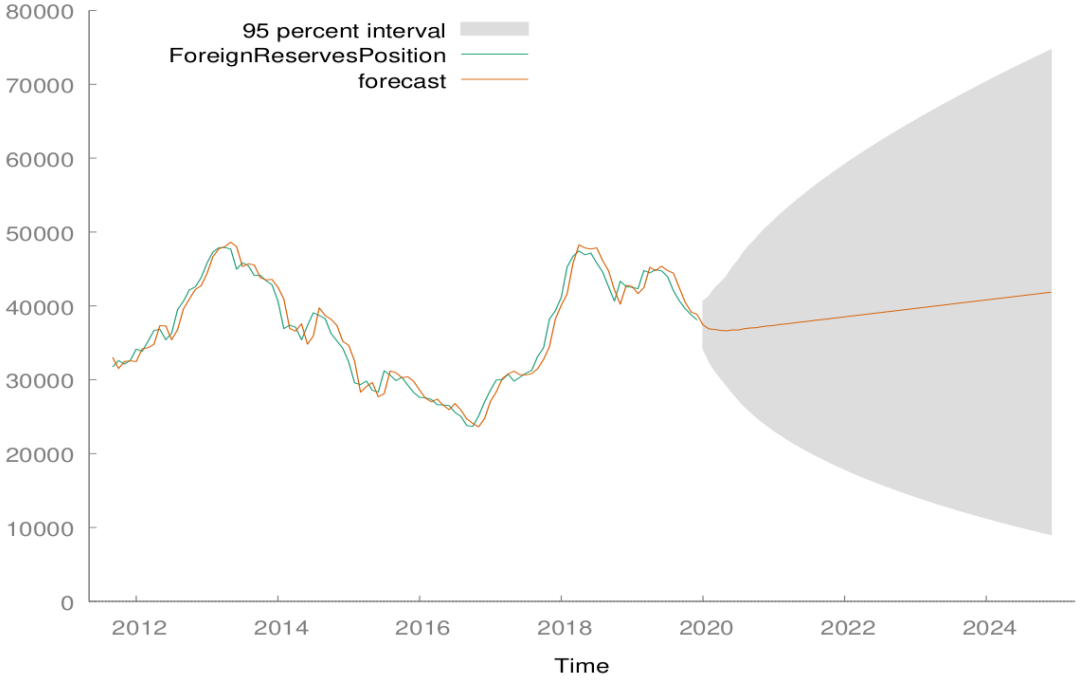


Figure 6. Graph of the forecast for the Nigeria Foreign Reserve (US$ millions) for the next five years

Interpretation

: Table 8 and Figure 6 revealed that the Nigeria External (Foreign) Reserve (US$ millions) will continue to rise steadily for the period forecasted.

4. Summary and Conclusion

4.1. Summary

The purpose of this analysis is to examine the time series analysis of the Nigeria External Reserve using Autoregressive Integrated Moving Average. The Nigeria external reserve was shown to be non-stationary in nature at its original level and it also has an upward trend from the time plot. Differencing of order one was done to transform the series from a non-stationary to a stationary series and this was found to be enough to make the series stationary as reported from the time plot, and results provided by both the Augmented Dickey- Fuller Test (ADF) and the Kwiatkowski-Philips-Schmidt-Shin Test (KPSS test). Several models were experimented upon but the ARIMA(2,1,7) was selected to be the best fit model using the selected criterions for optimal model selection which are the Akaike information criterion, Bayesian information criterion and Hannah-quinn information criterion. The selected model was also diagnosed and it was confirmed to be the best model for the data since its residual error was found to be normally distributed and the ACF and PACF lags hovered around the zero line. Nigeria external reserve future values was forecasted at 95% confidence interval for five years using the fitted ARIMA model from January 2020 to December 2024.

4.2. Conclusion

From the study, it was concluded that the Nigeria External Reserve is a series with an upward trend. The study also concludes that ARIMA (2,1,7) is the best model that fits the Nigeria External Reserve among other models after some diagnosis. Finally, the study concluded that the Nigeria External Reserve forecast made for five (5) years from January 2020 to December 2024 using the fitted model showed that the Nigeria External Reserve will continue to increase steadily for the time forecasted years if managed properly and this will aid economic policy makers in planning for the future years ahead. From the view of the study it is recommended that the government should put in place legal policies that will enhance increased accumulation and proper management of external reserves. Government should also take the value of external reserves seriously as that at the long run will determine the extent to which it can absorb global financial shocks and in the long run will improve the value of Nigeria currency and lastly the fiscal managers of Nigeria should exercise cushion in external borrowing in order to ensure that concurrent external debt service payment does not deplete the external reserves of the country. This study only focuses on the stationarity and forecast of the Nigeria foreign exchange from 1990 -2019 using time series techniques whereby ARIMA (2, 1, 7) was spotted to be the best model and used for prediction for 5 years. However, further study can consider previous years before year 1990 up to the current year and forecast further for some years to come in order to monitor the Nigeria external reserves.

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