STATISTICAL ANALYSIS OF INFLATION RATES IN NIGERIAN ECONOMY

[1]R.Y Akinbo, N.O Adeboye and [2]Akinde M. A

[1]Department of Mathematics & Statistics, Federal Polytechnic Ilaro. PMB 50, Nigeria

[2]Department of Accountancy, Federal Polytechnic Ilaro. PMB 50, Nigeria

e-mail: adeboye_olawale@yahoo.com. Phone Numbers 0803334814, 08186530233

ABSTRACT

This paper aims at examining the concept of inflation, its causes and impact on the Nigerian Economy. The paper employs the techniques of Least squares and Quadratic model in estimating the future inflation rates, as well as investigating the nature of trends and seasonal effect on the inflationary trend of Nigeria. The trend was found to be persistently upward based on the estimating prowess of the two techniques and the inflationary rate was found not to be affected by seasonal variation. The forecasted inflation figures after decomposition, detrended and seasonally adjusted the 120 months data give an average upward inflation trend of 77.6%.

INTRODUCTION

We speak of price-level changes when prices in general cease to be stable and are either rising or falling. Each of these phenomena, that is rising prices, otherwise known as inflation or falling prices, otherwise known as deflation, have far-reaching implications on both the individual, the firm and the entire economy.

To the individual, since money is worth only what it can buy at any point in time, the real value of money falls, this means that a fixed amount of money buys less in terms of goods and services. This leaves the individual impoverished as his standard of living falls. According to Chambers (2005: 172) the impact of inflation to business firms are:

i)   increase in the cost of components or raw materials

ii)   increase in wages and salaries of employees to keep pace with inflation;

iii)   rising service costs.

If business units cannot pass on these to consumers as higher costs or absorb the costs in higher productivity. Sales or turnover of business units will fall and in turn profits will decline and the scenario persists for a long time, it may occasion bankruptcy and liquidation. Since accounting systems are supposed to measure and report appropriately those financial events, what will lead to rational decisions to all stakeholders and which are important to the success or failure of a business, consequently reports by Accountants during periods of inflation becomes unreliable for making business decisions. To the economy, since the individual becomes impoverished and the productivity of firms falls, there would be no savings by individuals and business units which would be ploughed back into the economy as investment to create income through productivity.

The objectives of this effort among others are:

a)   Understand and appreciate the impact of inflation to the individual, business units and the entire Nigerian economy.

b)   To study the effect of seasonal on the inflationary rate in Nigeria

c)   To be able to predict the rate of inflation in Nigeria economy in the future.

Casually, inflation could be defined as a scenario whereby too much money is chasing fewer goods. According to Chambers (2005) inflation could be defined as a persistent tendency for prices to rise. In the same line of thought, Ayo (2005) defined inflation as an increase in the general level of prices that is sustained over a period of time. In his own contribution Nwaboku (1997) posited that inflation is a continuous rise in the general level of prices.

It is worthy to emphasize that the annual increase in prices may be small or gradual (creeping inflation), or large and accelerating (hyper inflation).

According to Ruffin and Gregory (1997), there are five fundamental facts about inflation that required explanation which are:

i)   Inflation is not inevitable

ii)   High inflation rates are associated with rates of growth of money supply especially in the long run.

iii)   Recent inflation has been more rapid than can be explained by the long-run, high inflation rates and high interest rates go hand in hand.

iv)   In the long-run, high inflation rates and high interest rates go hand in hand.

v)   There has been a clear-cut inflationary bias since the 1930s.

They re-emphasized that a good theory of inflation should account for the stated facts of inflation.

However, Ayo (2005) stated two main explanations of why inflation has:

a)   The presence of excess demand at the full employment level of national output which "pulls up" prices.

b)   An increase in wages and raw materials costs which "pushes-up" prices.

The explanation are based on the theory of Demand-Pull and cost Push inflation. Demand-pull inflation is caused by an excess of total spending (aggregate demand) at the full employment level of national income (potential gross national product). As it is not possible to increase output further the excess demand will cause prices to rise, that is real output remains the same but the money or nominal value of output well be inflated.

According to the monetarist school,, demand-pull inflation is caused by the excessive creation of money and they prescribe strict controls on the money supply as a means of reducing excess spending, likewise; the Keynesian school advocates cuts in spending as the way of tackling excess demand but in their case employees should be by increasing taxes and reducing government expenditure.

Cost-push inflation tends to be associated particularly with excessive increases in money wage rates, which is wages rate greater than what can be paid for by increases in the underlying rate of productivity growth. Cost-push inflation is also caused by increases in commodity prices. Cost-push inflation caused by excessive wage demand can be eliminated either directly by the use of controls on prices and incomers or more indirectly by measures to reduce the monopoly power of companies and trade unions.

MATERIALS AND METHODS

The data used for this research work was sourced from the publication of Central Bank of Nigeria Statistical Bulletin. Figures of Consumer Price Index (CPI) for 120 months were extracted between the periods of 2002 and 2011.

The time plot of the monthly series data is presented in fig 1 shown below.
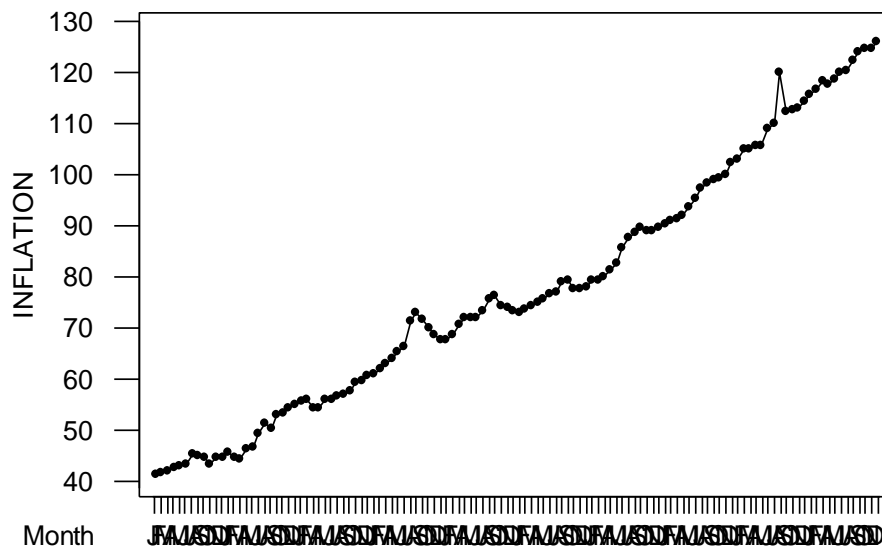

fig 1- Time Plot

The trend analysis and forecast were carried out with the following methods:

Least Square Method

Let Y_t be a given series over time t, with Y depending on t, the Least Square model is given as

$$Y_t = \beta_o + \beta_1 t + e_t \qquad\qquad\qquad\qquad (1)$$

Where β_o and β_1 are the parameters to be estimated and e_t is the ith error term distributed normally with mean 0 and variance σ_e^2 .

In predicting the future values based on equation (4), we adjust the data for the effect of seasonal variation and compute the forecast values from

$$\hat{Y}_t^{(A)} = T_t \ S_t \qquad\qquad\qquad (2)$$

Where T_t and S_t are trend and seasonal index over time.

Quadratic Model

This is a special case of the general linear model. It contained squared of the predictor variable (t) making the response function curvilinear. Thus the model derived is

$$Y_t = \beta_o + \beta_1 t + \beta_2 t^2 + e_t \qquad\qquad\qquad (3)$$

And the predicted model becomes,

$$\hat{Y}_t = \hat{\beta}_o + \hat{\beta}_1 t + \hat{\beta}_2 t^2 + e_t \qquad\qquad\qquad (4)$$

Seasonal Variation

This is a short – time variations from the trend that occurs as a result of a period of years. According to Shangodoyin and Ojo (2002), it is the identical pattern which a series appears to follow during corresponding months of successive years, such as movements which are due to recurring events, which take place annually, and is denoted by S_t.

RESULTS

Fitting of Least Square Model

The fitted model is

```
Yt = 35.5782 + 0.694659*t
```

The graph and forecast values are shown below

```
Accuracy Measures


MAPE:          4.01376
MAD:           3.07306
MSD:           15.0027


 Row   Period   Forecast

   1     121     119.632
   2     122     120.327
   3     123     121.021
   4     124     121.716
   5     125     122.410
   6     126     123.105
   7     127     123.800
   8     128     124.494
   9     129     125.189
  10     130     125.884
  11     131     126.578
  12     132     127.273
```
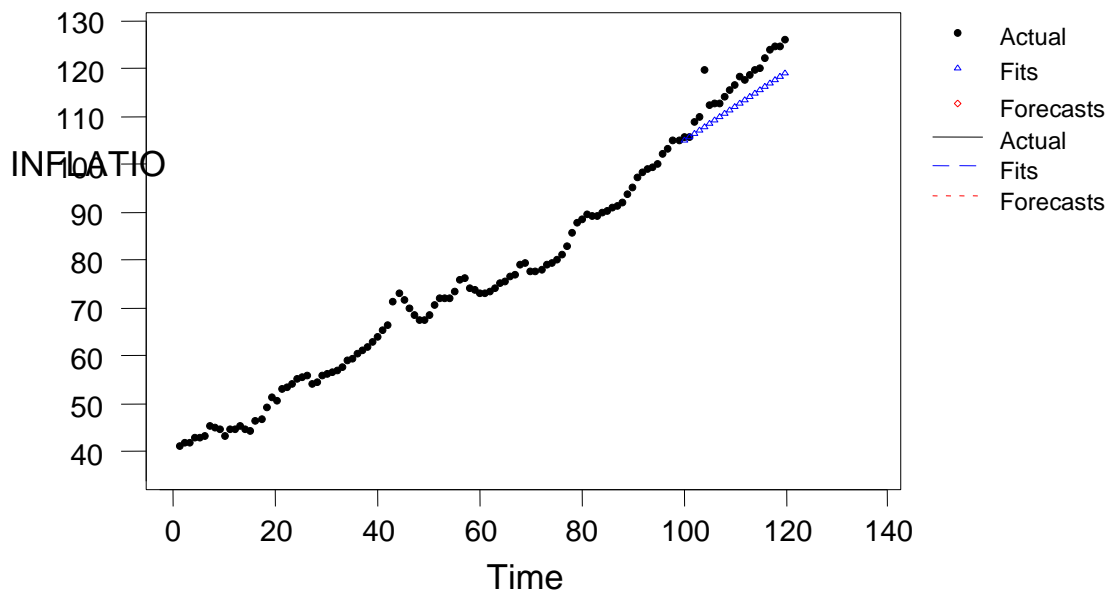
Fig 2- Least Square Trend and Forecast

Fitting of Quadratic Model

The Quadratic model is

```
Data          INFLATION
Length        120.000
NMissing      0

Fitted Trend Equation

Yt = 41.9642 + 0.380591*t  + 2.60E-03*t**2


Accuracy Measures

MAPE:         2.84867
MAD:          2.02173
MSD:          7.24425


 Row  Period  Forecast

  1     121    126.018
  2     122    127.029
  3     123    128.046
  4     124    129.067
  5     125    130.094
  6     126    131.126
  7     127    132.164
  8     128    133.206
  9     129    134.254
 10     130    135.307
 11     131    136.365
 12     132    137.428
```
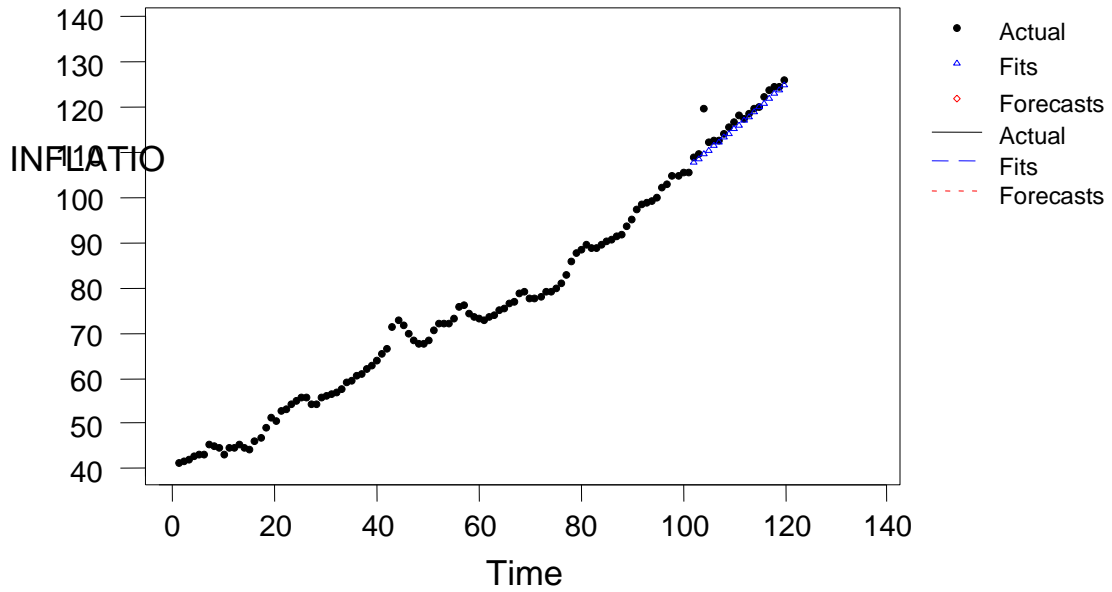
Fig 3- Quadratic Trend and Forecast

COMPUTATION OF SEASONAL VARIATION

Seasonal Indices

Period	Index
1	0.993054
2	0.985633
3	0.987566
4	0.985453
5	0.994190
6	0.998771
7	1.01163
8	1.02555
9	1.02427
10	1.00421
11	0.997530
12	0.992145

Accuracy of Model

MAPE: 29.253

```
MAD:        20.176
MSD:       590.834


Forecasts


Row   Period   Forecast

 1      121     77.0659
 2      122     76.4900
 3      123     76.6400
 4      124     76.4761
 5      125     77.1541
 6      126     77.5096
 7      127     78.5074
 8      128     79.5877
 9      129     79.4883
10      130     77.9320
11      131     77.4133
12      132     76.9954
```

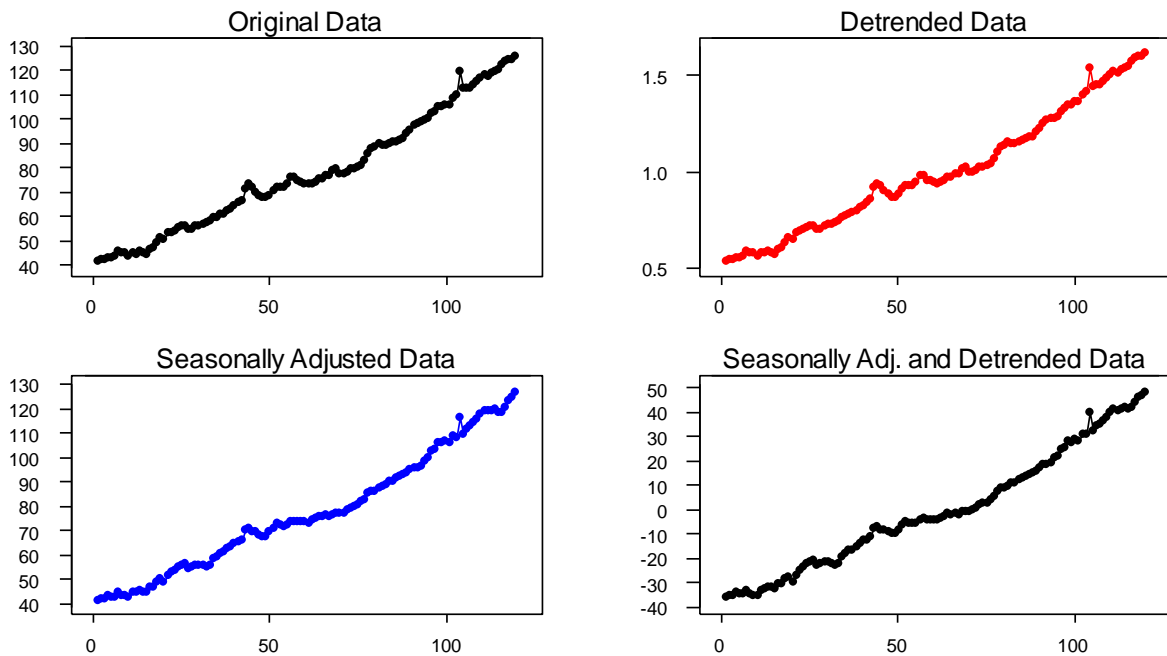# COMPUTATION OF SEASONAL VARIATION

Fig 4- Seasonal variation

DISCUSSION

In this study, we have seen clearly the estimation of the parameters of Least Square and Quadratic models. All the three techniques gave an upward trend in the estimation and twelve (12) month's forecasting of inflation in Nigeria, which is an evident of the worsening economic situation in Nigeria caused by series of bad government fiscal policies. Attempt to remove the effect of seasonal variation as shown in the above results has not yielded any positive result either, as it was observed that inflation trend still maintain an upward trend throughout the periods under consideration, though given rise to closely related forecast that put the inflation for the twelve (12) month's forecast at an average of 77.6%. Furthermore, going by the series of graphs presented in fig1-4, we can say without any prejudice that Nigeria's inflation has always maintaining an upward trend. When the effect of trend and seasonal were removed as observed in fig 4, we observed that inflation still maintain an upward trend as already exhibited in the time plot of fig 1.

CONCLUSION

As a result we have seen the performance of time series analysis in evaluating time data for trend and seasonal variation, as well as decomposing a time data. Based on all the aforementioned results, we can reasonably conclude that inflation trend in Nigeria will continue to maintain an upward trend for the time being, unless positive economic measures are put in place by the government. Also, it can be inferred that increasing trend of Nigeria inflation has not been affected by seasonal variation, but purely an all time economic issues.

References

Ayo J.A (2005): Increasing cost of operatons, www.uacnplc.com/news/publications/presentations/bizhighlights.pps

Chambers, R (2005): critical reflection of a development nomad,en.wikipedia.org/wiki/Robert-chambers.

Chartfield, C (1980) : *The Analysis of Time Series; An Introduction*, Chapman and Hall

Kolmogrov, A (1941) : *Stationary Sequences in Hilbert Space*, Bull. Math. Univ. Moscow 2, No. 6, 1941

Nwaboku, O.F (1997) : Comparative Outputs, Incomes and Price Levels in African Countries, www.afdb.org

Olatayo, T.O and O.O Alabi (2001): *Forecasting Modeling in Stochastic Time Series Process*. Jour. Of Mathematical Sciences Vol.22, No.2 , 135-142

Ojo J.F., Olatayo T.O. and Alabi, O.O (2008): *Forecasting in Subsets Autoregressive Models and Autoprojective Models* . Asian Journal of Scientific Research 1(5); 481-491, 2008

Ruffin R and Gregory P.R (1997): Principles of Economics, 3rd Edition, Scott Foresman, ISBN067318871X, 9780673188717

Shangodoyin, D.K and Ojo, J.F (2002): Elements of Time Series Analysis, 1st Edition, Rasmed Publications, Ibadan. ISBN 978-8024-32-7

Walonick, D. S (1983) : *An overview of forecasting Methodology*, StatPac.

Wiener, N (1949) : *The Extrapolation, Interpolation and Smoothing of Stationary Time Series with   Engineering Applications.* Willey, New York

Whittle, P (1983): *Prediction and Regulation by Linear Least Square Methods*. 2nd Edition, University of Minnesta, Minneapolis

Yaglom, A.M (1962) : *An Introduction to the Theory of Stationary Random Functions*. Prentice-Hall, Englewood Cliffs, 1962