Analysis of The Gross Domestic Product (G.D.P) of Nigeria:1960-2012

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Abstract

In this work, data on Nigerian Goss Domestic Product was collected online from the portal http://www.factfish.com/statistic-country/nigeria/grossdomesticproduct [10], *which covers a period of fifty three years (1960 - 2012). The probability plot of the data shows that the data is not normal, while the test of homogeneity of variance in the data shows that the data is not homogeneous. After decomposing the data into its component parts, it was discovered that Nigeria's GDP has a strong trend component with little or no seasonal component and enough residual component. Therefore, Time series trend analysis was used in analyzing the data, since the data has a strong trend component with little or no seasonal component. The result of the trend analysis shows that Nigeria has a better economic growth.*

Key words: *GDP, Decomposition, Linear Trend Model, Exponential Trend Model, and Quadratic Trend Mode.*

Introduction

The Gross Domestic Product (GDP) is one of the primary indicators used to measure the healthiness of a country's economy. It is also used to determine the standard of living of individuals in an economy. However, Gross Domestic Product could be defined as the market value of all officially recognised final goods and services produced within a country in a given period of time. This implies that Gross Domestic Product takes into account the market value of each good or service rather than adding up the quantities of the goods and services directly. Gross Domestic Product is important in an economy because it is used to determine if an economy is growing more quickly or more slowly. Also, it is used to compare the size of economies throughout the world. Again, the Gross Domestic Product is used in the comparison of relative growth rate of economies throughout the world. For instance, the Federal Reserves in the United States uses it as one of the indicators of whether the economy needs to be restrained or stimulated.

The components of Gross Domestic Product using the expenditure method includes; Consumption, Investment, Government expenditure, Gross export and Gross import. Where this could be expressed mathematically as GDP = C + I + G + (X - M). There are two other methods of calculating the Gross Domestic Product which are the Value Added (or Production) approach and the Income (or By Type) approach. In calculating Gross Domestic Product using either of the three approaches , it does not include intermediate goods, but only "new" products (final goods) and services, this is to avoid double counting which may lead to the presentation of an inaccurate value of GDP. There are two types of GDP in existence which includes; Real GDP and Nominal GDP. Where Real GDP is the measurement of economic output of a country minus the effect of inflation and Nominal GDP is the measurement that leaves the price changes in the estimate.

In this work, gross domestic product will be used in analyzing the Nigerian economy so as to determine the problems facing the economic development of the Nigerian economy and to device a means for

controlling these problems in order to experience rapid economic growth in the country. Also, models will be fitted for future predictions of the state of the economy based on its previous GDP data with the aim of describing the pattern in which Gross Domestic Product in Nigeria has followed since her independence, decompose the Nigerian GDP into its individual time series components, to make appropriate prediction for future economic growth in Nigeria, to conduct an intervention analysis for the Nigerian economy if the trend line is not strong by throwing warning signals to control the system and also to make recommendations based on the findings. This work will assist in determining if the economy is growing steadily, slowly or rapidly. It will also help in finding those problems associated with the economic growth of Nigeria using GDP as an indicator and will also assist in fitting a model for the Nigerian economy which can be used for the prediction of further GDP in the long run at it covers the Gross Domestic Product of the Nigerian economy for fifty-three years; from 1960 to 2012 inclusive.

2.0 The Concept Of Gross Domestic Product

The most comprehensive measure of the total output or performance of an economy is the Gross Domestic Product. Although, GDP is the most widely used measure of national output of an economy, two other concepts are frequently cited, Net Domestic Product and Gross National Product (GNP). The relationship among these three concepts (GDP, GNP and Net Domestic Product) is that they measure an economy's output.

Nnamocha [4], pointed out that Gross Domestic Product is the total money value of all goods and services produced in the domestic economy by everybody in that economy no matter where he/she comes from, provided he/she resides within the economy. According to him, GDP includes both the nationals and non-nationals of an economy and GDP must be equal to the value of only the final products.

Samuelson [9], explained Gross Domestic Product as the name given to the total market value of the final goods and services produced within a nation during a given year. From his description, of Gross Domestic Product, GDP is used for many purposes but the most important one is to measure the overall performance of an economy and this overall performance could be measured as a flow of final products or as a flow of cost. Both approaches will yield the same total GDP since profit, is a residual.

Kimberly [2], said that Gross Domestic Product is everything produced by all the people and all the companies within an economy.

The difference between Gross Domestic Product and Gross National Product is the fact that GDP is concerned with the region in which income is generated and focuses on where the output is produced rather than who produces it.

Ruffin [8], emphasized that Gross Domestic Product is the broadcast measure of the total output of the economy. Only final goods and services are included to avoid double counting of products.

GDP can be calculated by measuring the total value of income. Nominal GDP is the value of final goods and services in current market prices. Nominal GDP can rise because of either increasing output or rise in the price of products. Real GDP is the measure of the volume of real goods and services by removing the effect of rising prices. He also, said that non market goods, illegal goods and the value of leisure are not included in Gross Domestic Product because GDP is just a measure of the economic welfare and not a measure of economic "bads".

Abdulrasheed [1], in his work titled "The effect of inflation on GDP" stated that Gross Domestic Product is used as a means of adjusting the assets location and to decide where the best opportunity of investors lies.

Paul [6], defines Gross Domestic Product as the dollar flow of total product for a nation. It could be measured using the flow-of-cost approach or the income approach. According to Paul, GDP is a measure of Net Economic Welfare (NEW). This is because the calculation of Net Economic Welfare adds to the GDP certain items such as value of leisure, homemakers services and do it yourself activities. It also subtracts from GDP unmet

costs of pollution, other disamenities of modern urbanization and some other adjustments.

Kumar [3], in his work titled "Macroeconomics theory, analysis and policy", said that use of this word "gross" along with "domestic product" indicates that we are calculating domestic product inclusive of the depreciation allowance or consumption fixed capital.

3.0 The Concept Of Time Series Analysis

The term "time series" is a collection of observations made sequentially in time. Time series are stochastic in nature because randomness and probability are attached to its observations. Nwachukwu [5], said that the need to monitor, evaluate and make adequate plans for the future compel managers, scientists of various calling and researchers alike to collect data on regular basis on process that vary as time passes. Observation on such processes when arranged in chronological order (in time sequence) is called time series.

Paul [7], in his contribution to the importance of time series model said that modern time series forecasting methods are essentially rooted in the idea that the past tells us something about the future. The question of how exactly are we to go about interpreting the information encoded in past events and furthermore, the question of how we are to extrapolate future events based on previous information, constitute the main subjective matter of time series analysis.

3.1 Data Collection And Validity Test Analtsis

The data for this study was collected online from the portal: http://www.factfish.com/statistic-country/nigeria/grossdomesticproduct [10].

Therefore, the data is a secondary data. The research covers the Gross Domestic Product of Nigeria from 1960 to 2012 inclusive.

For the validity of the instrument; in figure 2.0 of the appendix, the probability plot of GDP shows that the data is not normally distributed since the p-value is less than the alpha value also; the actual plot is off from the fitted line, indicating that the data is not normally distributed.

However, the test of homogeneity of variance using the Pettittt's test was used and it shows that the data are not homogeneous since the p-value of the pettitt's test is less than the alpha value. While decomposing the data into its component parts, the time series plot of the trend component in figure 3.0 shows that the GDP of Nigeria has a strong trend (pattern), since GDP increases as the year increases.

The time series of the seasonal component in figure 4.0 indicates that there is little or no seasonal component in Nigeria's GDP since the values of the decomposed seasonal component are so small compared to the actual values of GDP

Also, from the time series plot of the residual component in figure 5.0, the plot indicates that there is enough residual in the data of Nigeria's GDP, since the values of the decomposed residual component are large enough which also implies that the ARIMA model will not be suitable for the analysis of Nigeria's GDP.

However, since the data has a strong trend component with little or no seasonal component, this implies that the time series trend analysis will be suitable for analyzing the data of Nigeria's GDP.

Data Collection And Validity Test Analtsis

Time Series Plot of The Data

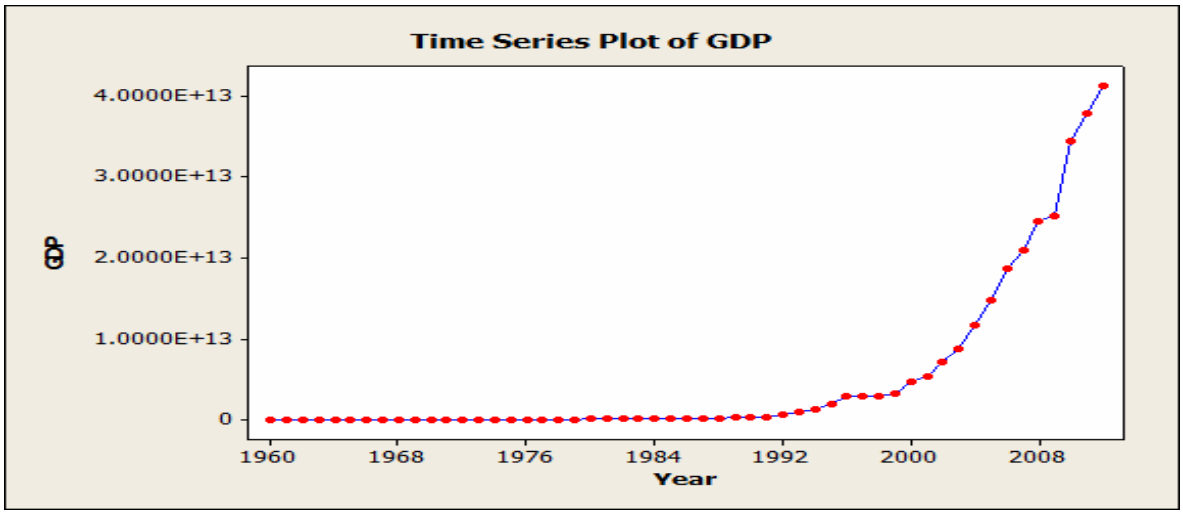

Fig.. 1.0

TIME SERIES TREND ANALYSIS

Linear Trend Model

Fitted Trend Equation

Y_t = -7563141953898 + 471024213762*t

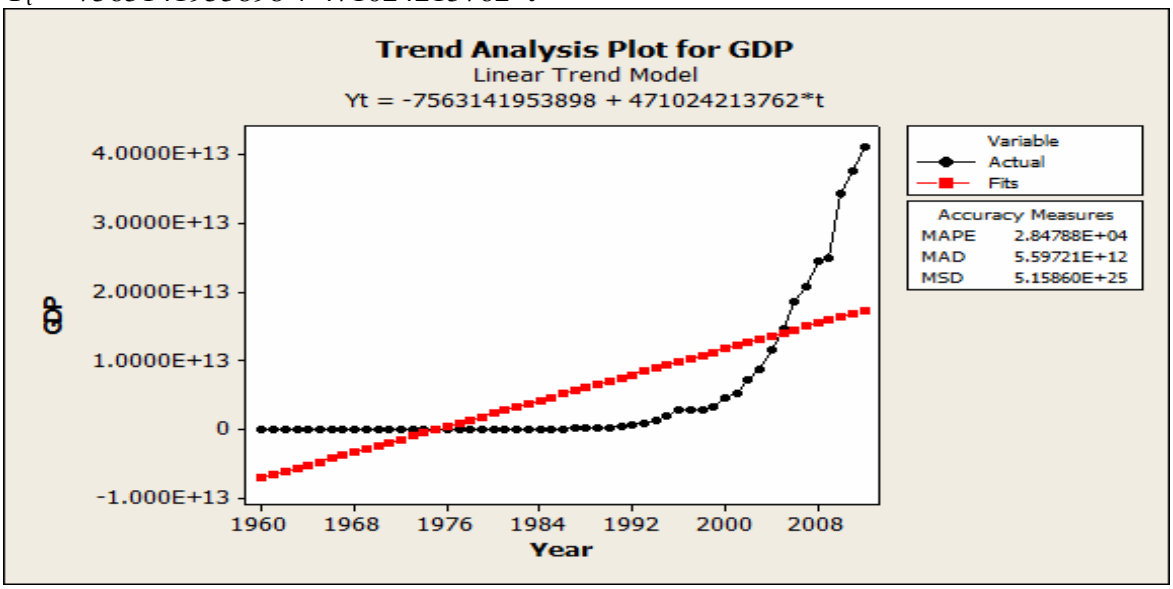

Fig. 6.0 **Exponential Trend Model**

Fitted Trend Equation

Y_t = 886388278 * (1.22467**t)

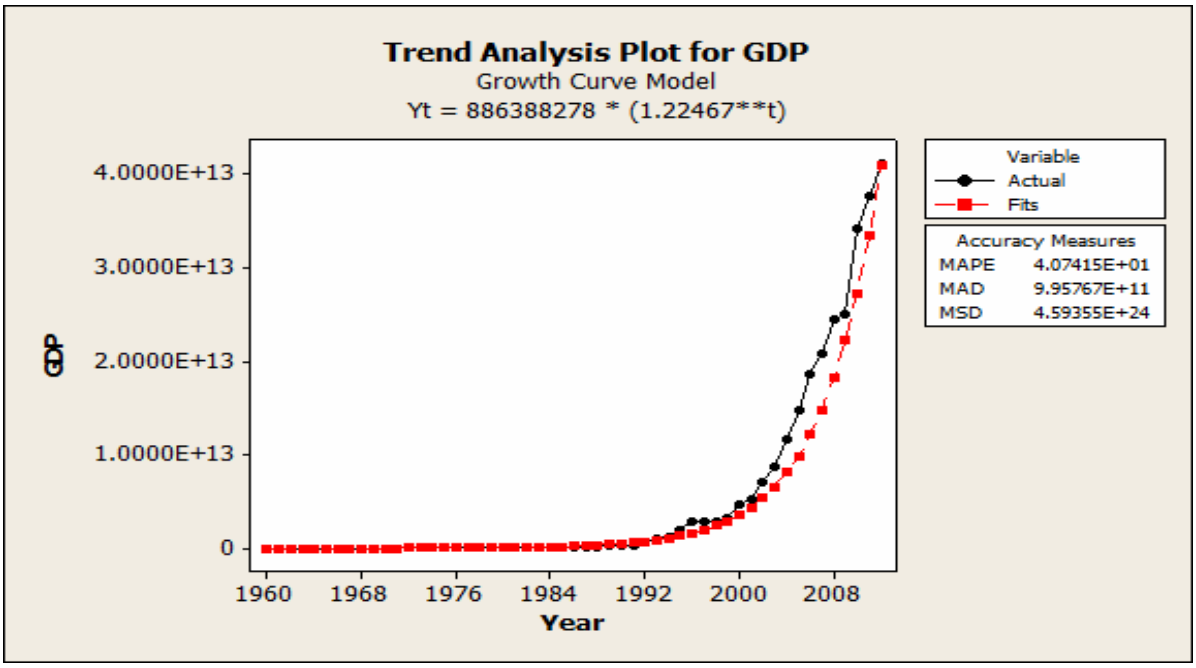

Fig.7.0

Quadratic Trend Model

Fitted Trend Equation

Y_t = 6669603197423 - 1081638893655*t + 28753020508*t**2

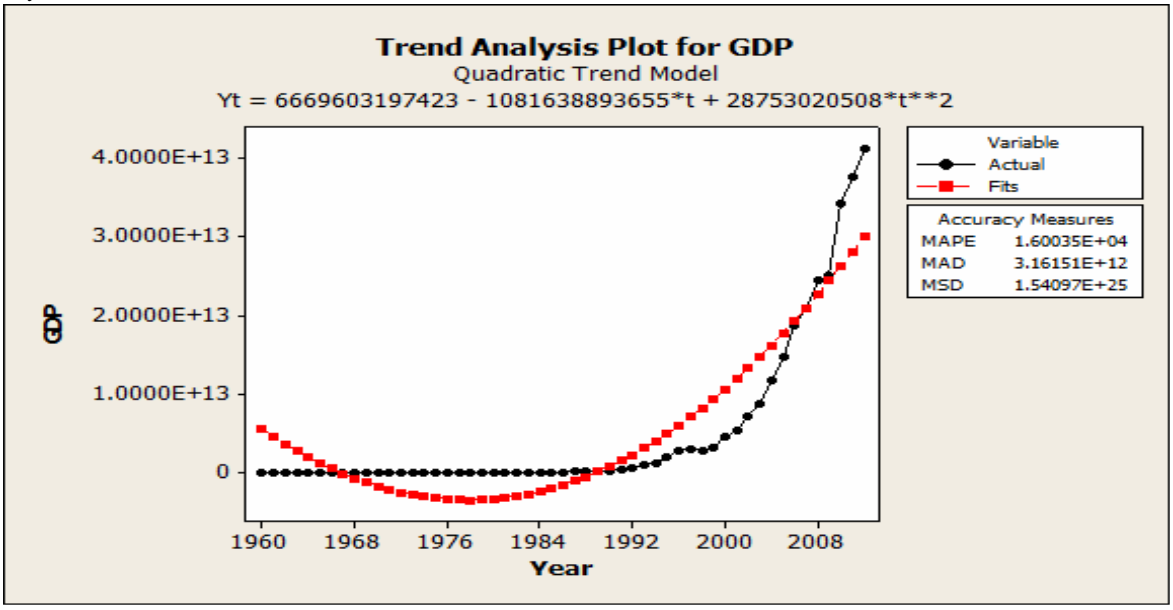

Fig.8.0

Table 3.0 **Comparing The Accuracy Measures Of The Models**

Linear Trend Model	**Exponential Trend Model**	**Quadratic Trend Model**
MAPE 2.84788E+04	MAPE 4.07415E+01	MAPE 1.60035E+04
MAD 5.59721E+12	MAD 9.95767E+11	MAD 3.16151E+12
MSD 5.15860E+25	MSD 4.59355E+24	MSD 1.54097E+25

From table 3.0 above, we can see that the quadratic model has the smallest accuracy measures. The Mean absolute percentage error (MAPE), Mean absolute deviation (MAD) and Mean squared deviation (MSD) are all small in the quadratic model than in the Linear and exponential trend models, showing that the quadratic model fits the data better than the other models. Therefore we shall make forecasts using the quadratic trend model

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Table 4.0: **YEAR Forecasts**

Period	Forecast
2013	3.21049E+13
2014	3.41574E+13
2015	3.62673E+13
2016	3.84347E+13
2017	4.06597E+13

TIME SERIES PLOT OF THE FORECASTS

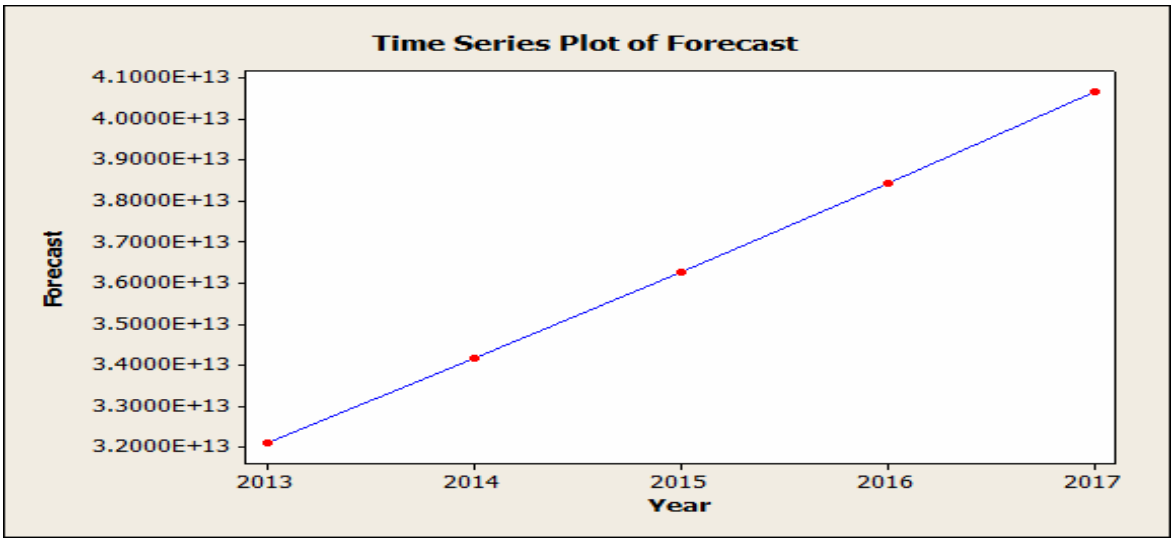

Fig.9.0

4.1 Interpretation of Results

From the trend analysis, conducted in the research using the linear trend model, exponential trend model and quadratic trend model, the result shows that the quadratic model has the smallest accuracy measures since the Mean Absolute Percentage Error (MAPE), Mean Absolute Deviation (MAD) and Mean Square Deviation (MSD) are all small in the quadratic trend model than the linear and exponential trend models respectively. This implies that the quadratic trend model fits the data of Nigeria's GDP than the other models.

In conclusion, since the quadratic model fits the data better, it was used to make forecast for Nigeria's GDP for five years of which the forecast shows that Nigeria's GDP will be around 3.2 trillion naira in 2013, 3.4trillion naira in 2014, 3.6 trillion naira in 2015, 3.8 trillion naira in 2016 and 4.1 trillion naira in 2017 respectively. Thereby, indicating that Nigeria will experience better economic growths within these periods

5.0 Conclusion And Recommendations

From the trend analysis of the Nigerian GDP, the result shows that there is an upward trend which indicates that Nigeria is experiencing a rapid economic growth which also implies that in the nearest future Nigeria will experience a better economy than it has experienced in the past.

We recommend that data on Gross Domestic Product should be done by experts in the field to avoid the problem of double counting and miscomputation of the data.

However, organisations/websites responsible for data publishing should try as much as possible to publish updated data on economic indicators such as GDP on time.

Finally, the Nigerian government should try as much as possible to make sure that forecasts on Gross Domestic Product for the country is done from time to time, so as to checkmate those factors that may lead to decrease in economic growth. This is because it is only when the economy is balanced that every other sector in the country will be balanced .

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APPENDICES

Statistical analysis of the Nigerian gross domestic product (from 1960 – 2012)

DATE	VALUE
1960	2,997,268,736.00
1961	3,190,921,216.00
1962	3,506,715,136.00
1963	3,689,708,800.00
1964	3,966,381,056.00
1965	4,196,100,000.00
1966	4,547,800,000.00
1967	3,716,600,000.00
1968	3,715,000,000.00
1969	4,738,800,000.00
1970	8,961,500,000.00
1971	10,375,400,000.00
1972	11,034,700,000.00
1973	12,251,600,000.00
1974	19,604,000,000.00
1975	22,945,400,000.00
1976	28,611,400,000.00
1977	33,585,000,000.00
1978	36,053,000,000.00
1979	42,912,000,000.00
1980	50,270,000,064.00
1981	50,751,000,000.00
1982	51,953,000,000.00
1983	57,144,000,000.00
1984	63,608,000,000.00
1985	72,355,000,000.00
1986	73,062,000,000.00
1987	108,885,000,000.00
1988	145,243,000,000.00
1989	224,796,600,000.00
1990	260,637,000,000.00
1991	328,115,300,000.00
1992	620,077,000,000.00
1993	967,280,000,000.00
1994	1,237,122,000,000.00
1995	1,977,737,000,000.00
1996	2,823,932,000,000.00
1997	2,939,651,000,000.00
1998	2,828,656,000,000.00
1999	3,211,150,000,000.00
2000	4,676,394,201,100.00
2001	5,339,063,000,000.00
2002	7,128,203,099,900.00
2003	8,742,646,645,900.00
2004	11,673,602,238,000.00
2005	14,735,323,931,000.00
2006	18,709,576,651,000.00
2007	20,874,172,356,000.00
2008	24,552,776,283,000.00
2009	25,102,937,792,000.00
2010	34,363,818,159,000.00
2011	37,754,437,788,000.00
2012	41,179,149,997,055.00

SOURCE:http://www.factfish.com/statistic-country/nigeria/grossdomesticproduct

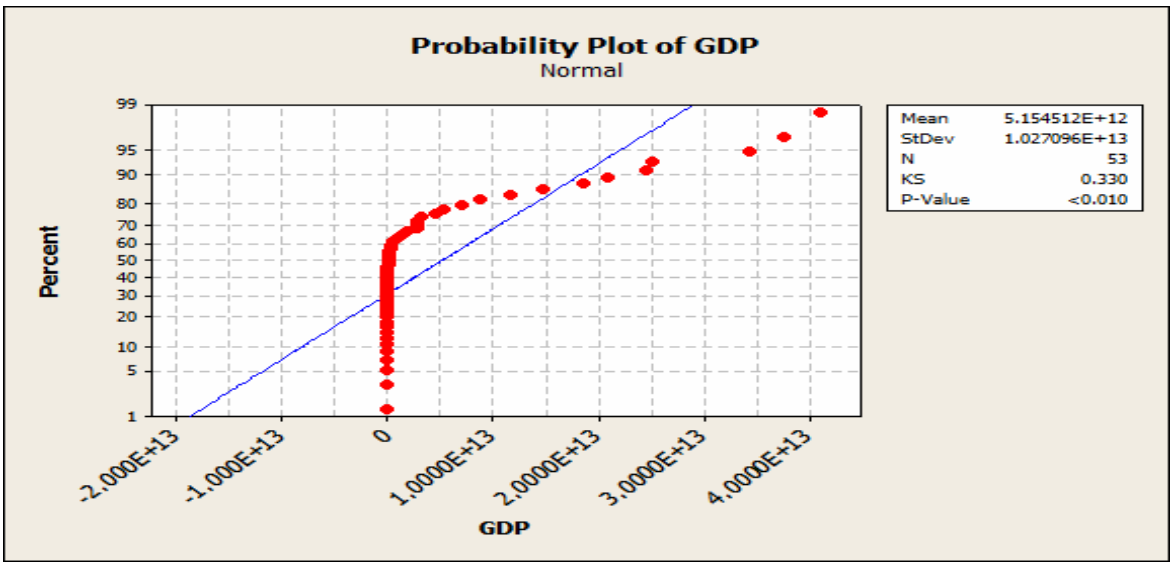

fig 2.0 Chart 2 shows that the data is not normally distributed.

Test For Homogeneity Of Variance

Hypothesis:

H_0: Data are homogeneous

H_1: There is a date at which there is a change in the data

Decision Rule: We shall reject H_0 if p-value<α, otherwise, we shall not reject H_0. α = 0.05.

Pettitt's test

K	702.000
T	26
p-value	< 0.0001
Alpha	0.05

Table 2.0

Conclusion: The p-value (0.762) of the Pettitt's Test leads us to reject the null hypothesis, thereby concluding that the data are not homogeneous.

Decomposition Of The Data Into Its Component Parts

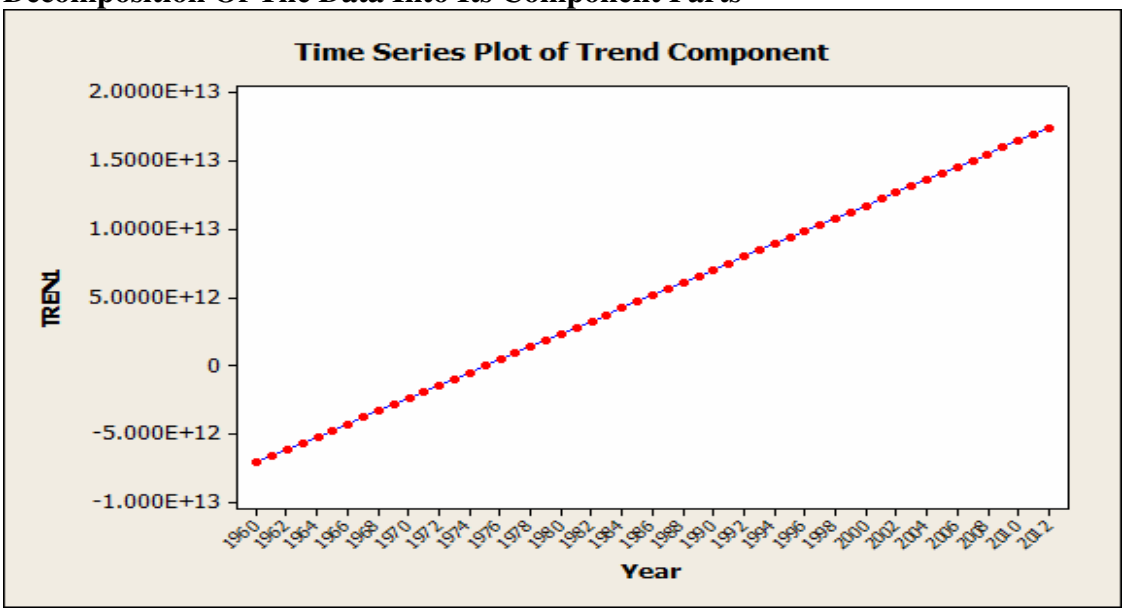

Fig 3

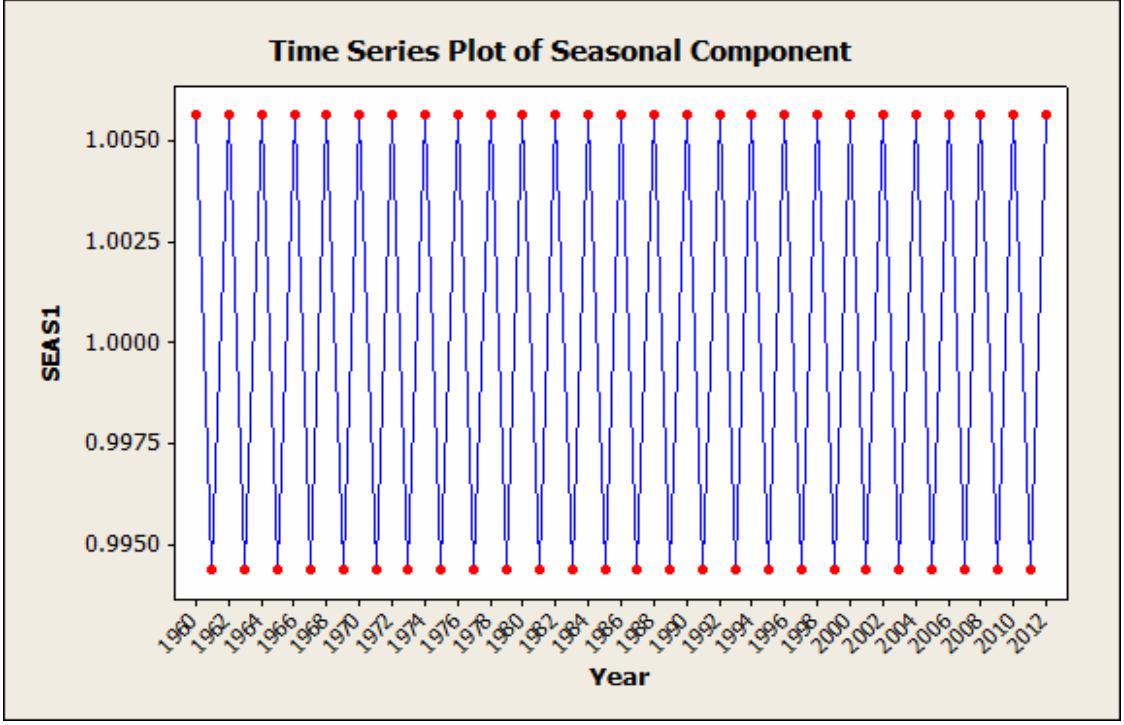

Fig 4

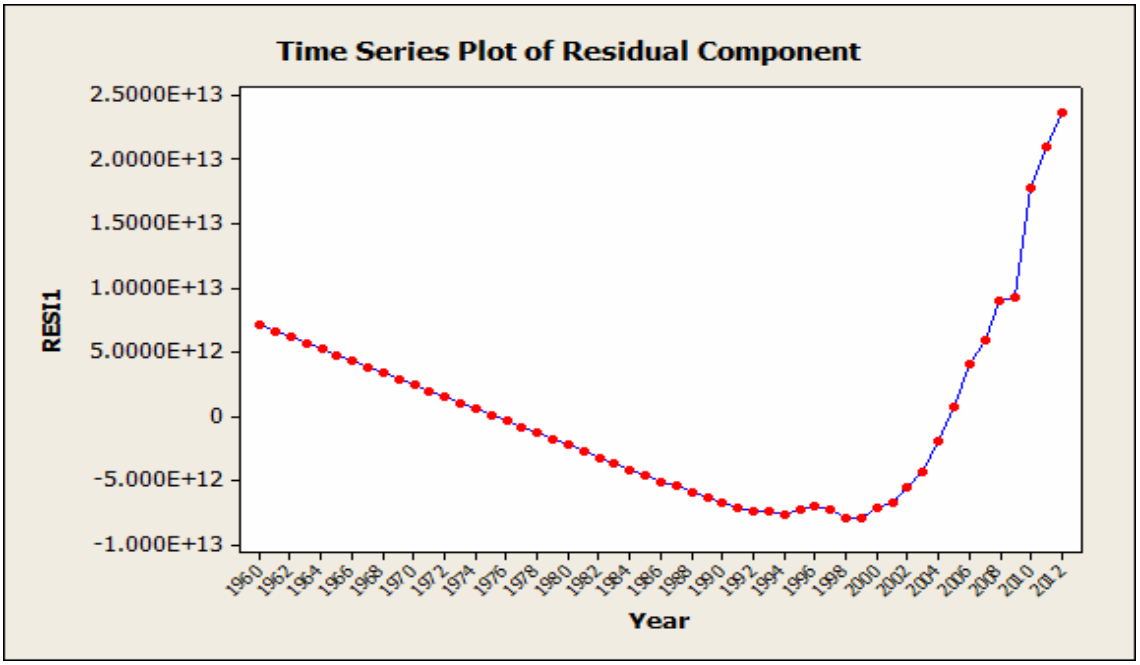

fig 5.0

The charts above show the respective components of the Gross Domestic Products time series data. Figure 3.0 shows a strong trend (pattern) in the data. Figure 4.0 shows little or no seasonal component in the data, while figure 5.0 shows the residuals (detrended data) of the GDP

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