

EVALUATION OF FOREIGN DIRECT INVESTMENT IN NIGERIA: A MULTIPLICATIVE TIME SERIES APPROACH.

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ABSTRACT.

This research was conducted to evaluate impact of Foreign Direct Investment (FDI) on Nigeria Economy using time series analysis. The data used in this work were secondary data sourced from Central Bank of Nigeria (CBN) bulletin on quarterly basis over a period of 12 years from 2006 to 2017. Multiplicative time series model was fitted to enable us removed all the deterministic seasonality factors, deseasonalized and finally forecast future values. The results obtained revealed that there were seasonal, cyclical and irregular fluctuations in the series. These were further isolated by fitting a straight line model which enabled us compute the trend values and seasonal index used in estimating the point estimate for 2018. The result of the point forecast showed that 631.3504 billion will be invested in the first quarter of 2018 and 647.3698 billion will be invested in the second quarter. Also 658.1691 billion will be invested in the third quarter and 715.0048 billion. This however, reveals that Nigeria economy looks more promising in the last quarter of 2018 than other quarters of the year because the higher the investment, the more robust the economy.

Key words: Trend, Seasonal, Cyclical, Irregular, Deseasonalized

INTRODUCTION.

Foreign Direct Investment (FDI) refers to a movement of capital that involves ownership and control of a firm in another country. Foreign Direct Investment to the host economy is believed to increase employment augment the productivity,

boost export and amplified pace of technology Adeolu (2007). The underdeveloped nature of the Nigeria Economy that essentially hindered the pace of her economic development has necessitated the demand for foreign direct investment into the country. The technical,

organizational knowledge and information available for the production of many goods and services together with the tool available for producing the goods are made available through many foreign controlled enterprises established in developing countries. Chenery and Stout (1996) and Nwillima (2008), believed that trans-national corporations (TNCS), though their FDI could provide much of the “motor” needed for economic growth in developing countries. According to (UNCTAD 1999), foreign direct investment leads to the growth of enterprises by providing access to western markets. This growth in turn provides a source of new jobs and stimulates demand for inputs from domestic suppliers. FDI introduces new market entrants beyond the domestic economies hosting trans-national corporations (TNCS). Aremu (1997), Nigeria as one of the developing countries of the world, has adopted a number of measures aimed at accelerating growth and development in the domestic economy, one of which is attracting foreign direct investment. World Bank 1996 and Khan 2007 assert that foreign direct investment has emerged as the most important source of external resource flow to developing countries over the years and has become a significant part of capital formation in those countries, though their share in global distribution of FDI continue to remain small or even declined. The role

of foreign direct investment has been widely recognized as a growth- enhancing factor in the developing countries of the world. Shiro (2009) noted that since the enthronement of democracy in 1999, the government of Nigeria has taken a number of measures necessary to woo foreign investors into Nigeria. These measures he noted include; the repeal of laws that are inimical to foreign investment growth, promulgation of investment laws etc.

MATERIALS AND METHODS

Quarterly values of Nigeria’s Foreign Direct Investment(FDI) in billion naira, was obtained from the Bureau of statistics of Nigeria’s 2017 Statistical bulletin. The sample period was from the first quarter 2006 to fourth quarter 2017.

Multiplicative Time Series Model

The basic methodological approach was the application of multiplicative time series model to determine the seasonal pattern in the Nigeria FDI data associated with various quarters and other components of time series. Time series is a set of observations on a variable of interest that has been collected in time order Bowerman and O’connell 2003. However, Eke and Ukwubuiwe 2017 see time series as a set of observation on a quantitative variable collected over equal interval of time. Time series analysis is the statistical analysis of a sequence of data gathered at uniformly

spaced interval of time. It involves the detailed study of past and present time series in order to predict the future values, that is, we analyze the past behavior of a variable in order to predict its future behavior Eke and Ukwubuiwe 2017. The essence of time series analysis is to forecast. Forecasting is fundamental to decision making. In order to identify patterns in time series data, it is often convenient to think of such data as consisting of several components; Trend, Seasonal, Cyclical and Irregular fluctuations (Uwa 2014). The multiplicative time series model is given by:

$$Y_t = T_t \times S_t \times C_t \times I_t(1)$$

Where T_t is the trend, S_t is the seasonal variation, C_t is the cyclical fluctuations and I_t is the irregular factors.

Trend: The trend was estimated using four quarter moving average (MA) method. Thus, the 4 quarter moving average is denoted by:

$$T_t = \frac{\sum_{t=1}^4 Y_t}{8}(2)$$

Seasonal and Irregular components: the centered moving average in the series was considered to equal $T_t \times C_t$, because the averaging procedure was assumed to have removed seasonal variations. Thus each moving average was computed using exactly one observation from each season and irregular variations, leaving the trend and cyclical effects. Hence,

$$S_t \times I_t = \frac{Y_t}{T_t \times C_t}(3)$$

Seasonal variation and seasonal index:

The seasonal variation S_t was computed by grouping the values of $S_t \times I_t$ in quarters and estimated an average (\bar{S}_t) for each quarter and then normalized that they summed;

$$\bar{S}_t = \frac{\sum_{i=1}^4 Q_i}{T-1}(4)$$

$$\text{and } S_t = \frac{L}{\sum_{i=1}^4 \bar{S}_t}(5)$$

where $L = 4$, the normalization process resulted in the estimates

$$S_t \text{ index} = \frac{L}{\sum_{i=1}^4 \bar{S}_t}(\bar{S}_t) \quad (6)$$

Deseasonalization: According to (Gujarati and Porter 2009) and (Okoroafor *et al* 2013) deseasonalization is the process of removing the seasonal components from a time series. This was done to enable us concentrate on the trend, cyclical and irregular components and better estimate the trend. To deseasonalized our series, we used

$$D_t = \frac{Y_t}{S_t}(7)$$

Equation (7) enabled us to remove the seasonality in the data. However, trend value was better estimated using least square method given by

$$T_t = \beta_0 + \beta_1 t(8)$$

Where β_0 and β_1 are the intercept and the slope of equation (8) fitting a straight line to observations in equation (7) we obtained the trend using the dependent variable d_t and t as the independent variable. Where

$$d_t = \beta_0 + \beta_1 t + \varepsilon_t(9)$$

RESULTS AND DISCUSSIONS.

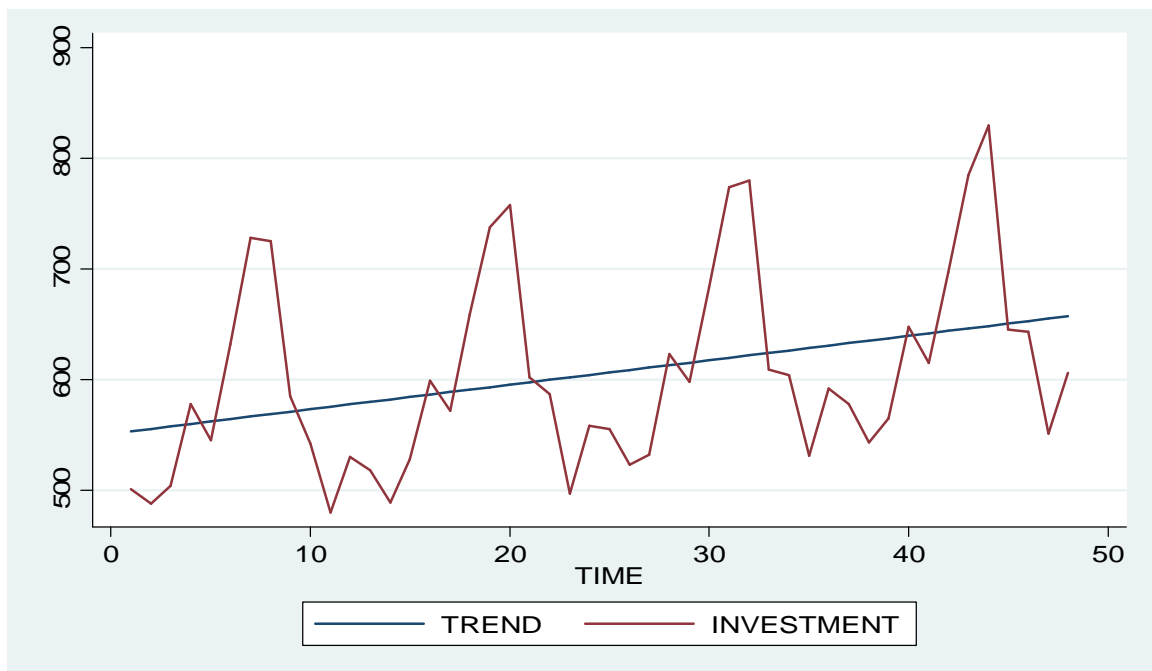


Fig 1: plot of original data and trend values

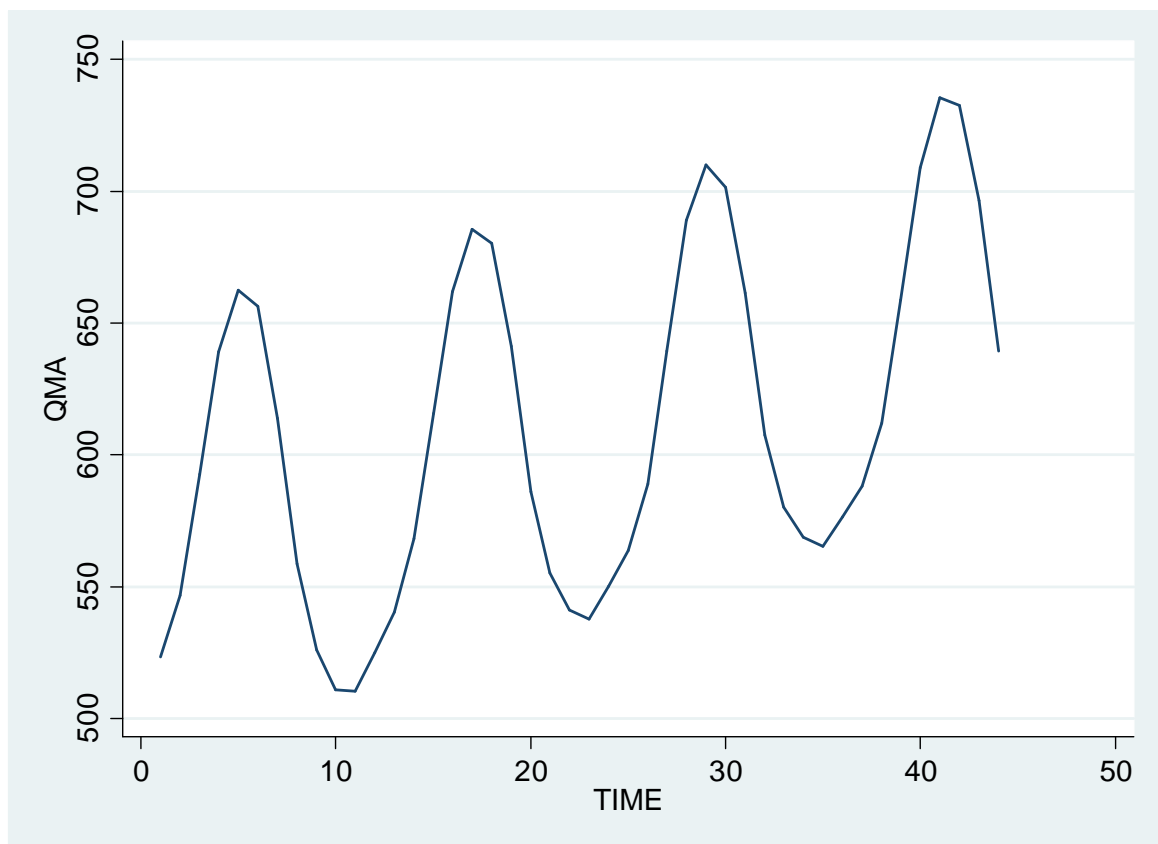


Fig 2: plot of 4 quarter moving average

Table 1: investment, 4 quarter moving average, seasonal variation and deseasonalized factors

year	QTR	INVEST	4QMA	Seasonal variation	deseason	year	QTR	INVEST	4QMA	Seasonal variation	deseason
2006	I	501	-	0.957	523.35	2012	I	555	537.63	0.957	579.76
	II	488	-	0.978	498.83		II	523	550.13	0.978	534.6
	III	504	523.25	0.991	508.42		III	532	563.63	0.991	536.67
	IV	578	546.76	1.073	538.52		IV	623	589	1.073	580.44
2007	I	545	592.75	0.957	569.32	2013	I	598	639.25	0.957	624.68
	II	632	639.16	0.978	646.02		II	683	689.13	0.978	698.15
	III	728	662.5	0.991	734.39		III	774	710.13	0.991	780.8
	IV	725	656.25	1.073	675.47		IV	780	701.63	1.073	726.72
2008	I	585	614	0.957	611.1	2014	I	609	661.38	0.957	636.17
	II	542	558.63	0.978	554.03		II	604	607.5	0.978	617.4
	III	480	525.88	0.991	484.21		III	531	580.13	0.991	535.66
	IV	530	510.88	1.073	493.79		IV	592	568.63	1.073	551.56
2009	I	518	510.25	0.957	541.11	2015	I	578	565.25	0.957	603.79
	II	489	524.88	0.978	499.85		II	543	576.5	0.978	555.05
	III	528	540.25	0.991	532.64		III	565	588.13	0.991	569.96
	IV	599	568.25	1.073	558.08		IV	648	612	1.073	603.73
2010	I	572	615.88	0.957	597.52	2016	I	615	658.75	0.957	642.44
	II	659	662.13	0.978	673.62		II	697	709	0.978	712.47
	III	738	685.75	0.991	744.48		III	785	735.5	0.991	791.89
	IV	758	680.5	1.073	706.22		IV	830	732.5	1.073	773.3
2011	I	602	641.25	0.957	628.86	2017	I	645	696.5	0.957	673.78
	II	587	586	0.978	600.02		II	643	639.25	0.978	657.27
	III	497	555.13	0.991	501.36		III	551	-	0.991	555.84
	IV	558	541.25	1.073	519.88		IV	606	-	1.073	564.6

Table 2: Estimation of trend coefficients using least square method

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. reg investment time
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Source	SS	df	MS	Number of obs =	48
Model	45155.9292	1	45155.9292	F(1, 46) =	6.34
Residual	327481.55	46	7119.16413	Prob > F =	0.0153
				R-squared =	0.1212
				Adj R-squared =	0.1021
Total	372637.479	47	7928.457	Root MSE =	84.375

investment	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
time	2.214014	.8790985	2.52	0.015	.4444808 3.983548
_cons	551.0275	24.74263	22.27	0.000	501.2232 600.8318

Table 3: Forecast/Prediction of 2018 investment in Nigeria

YEAR	QTR			
2018	QI	QII	QIII	QIV
AMOUNT	631.3504	647.3698	658.1691	715.0048

DISCUSSION OF RESULTS.

Fig 1 shows the plots on amount of foreign direct investment in Nigeria over time (year) and the trend values. It revealed that there were upwards and downwards with seasonal spikes which suggested that there were increasing seasonal variations in the quarterly data. This implied that there were periods or quarters where more are invested in Nigeria than others quarters to increase her foreign earnings.

Fig 2 is a plot of four quarter moving average against time (year). The figure revealed that there were periodic patterns in the time series that complete themselves

within a calendar year or less and then were repeated on a regular basis as well as recurring up and down movements around trend level, which depicted cyclical fluctuations in series. This implied that there were seasons or periods where foreigners invested more than other seasons or periods. However, since there were still fluctuations in four quarter moving average, we cannot use it in forecasting future government earnings through foreign direct investments. However, we need to compute the seasonal index (see table 1). However, from table 1, the four quarter centered moving average of the series, showed that the first and second

quarters of 2006 and third and fourth quarters of 2017 were missing as a result of the moving average method applied. The table revealed that there were both seasonal and cyclical variations in the series that completed themselves within a calendar year or less and then were repeated on a regular basis as well as recurring up and down movements around trend level, which depicted cyclical fluctuations in series.

The table 1 equally showed the seasonal index of the series. From the table, we observed that the quarter with the highest seasonal influence was the fourth quarter while the quarter with the lowest influence was the third quarter. This implied that more was invested in fourth quarter than any other quarters and the government invested the least in the third quarter.

Furthermore, table 2 showed that the coefficient of t was positively related to deseasonalized observation d_t and was statistically significant at 5%. This implied that time contributed significantly or determines what was invested thus, any unit increase in time (year), leads to increase in the amount invested by 2.214 billion.

Finally, table 3 showed the amount to be invested in 2018 using point forecast/prediction method revealed 631.3504 billion will be invested in the first quarter of 2018 and 647.3698 billion will be invested in the second quarter. Also 658.1691 billion will be invested in the third

quarter and 715.0048 billion will be invested in last quarter of the year. This showed that there is upwards movement in the amount to be invested which indicates that more money will be invested in the fourth quarter than other quarters in 2018.

CONCLUSION AND RECOMMENDATIONS.

A Proper decomposition of Economic time series into trend, seasonal, cyclical and irregular components is an important step to take if the influence of the unknown population parameters in Economic theory are of interest. However, in this work, it was observed that there were periodic patterns in the time series that completed themselves within a calendar year or less and then were repeated on a regular basis as well as recurring up and down movements around trend level, which depicted cyclical fluctuations in series. This implied that there were seasons or periods where foreigners invested more. The result of the point estimate or forecast 631.3504, 647.3698, 658.1691 and 715.0048 showed that more money will be invested in Nigeria in the last quarter of 2018 than any other quarter.

Finally, we recommend that Nigeria government should encourage steady flow of Foreign Direct Investment (FDI) so as to enhance and improve the national GDP for a better economic growth.

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