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Stock Market a Proxy for Oil Prices – A Focus on the Nigerian Economy

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Abstract

This research unearths the jolts in oil prices that has effect on the actual stock returns in Nigeria over 2001-2011 using multivariate regression models. Variables ranging from altering oil prices, changes in stock returns, changes in exchange rates and altering world market index were employed. For the purpose of this study, oil is specified as crude oil, extracted in commercial quantity and distributed to the international economy.

This study offers support for the hypotheses that; relationship between share prices and oil prices, exchange rates and world market index does exist. Share prices of Nigerian companies respond negatively to changes in exchange rate, therefore share prices increase when the Naira appreciates against the American dollar. The t test results confirm that all but seven companies correlate to the three variables. This confirms strong evidence of stock market correlation between the Nigerian stock market and the three independent variables. Holding all other factors constant, it can be asserted that share prices of Nigerian companies respond positively to the world market and oil prices. Hence, share prices increase when the world market improves; share prices also increase with oil prices.

Keywords: oil price, share price, exchange rate, Nigeria.

1. Introduction

Oil is the lifeblood of modern economies. It is in truth, so important in the international economy that it predicts the economic growth and is routinely licensed with the admonition, provided there is no oil shock, Sadorsky (1999). The effect of oil price shocks and exchange rate variability on the economic growth of Nigeria has been of great

interest to both the academicians and policy makers for decades now. The need for this work stemmed from studies of the Nigerian oil and gas sector, particularly from observing the extent of changes in international fuel price over time. This raised the question "Will investment in the stock exchange yield equivalent returns as direct investment in oil and gas?" The research is set out to identify the existence of relationships linking stock prices, oil prices and exchange rate, the extent of this bond and if these relationships can be exploited by proxy investments i.e. if equivalent benefits will accrue to investors by investing in one of the variables instead of another.

In comparison to the degree of research done on exploring the connection between oil prices and macroeconomic variables, reserved work is done on the association of oil prices and financial markets. There are however three remarkable exceptions (Jones and Kaul, 1996; Huang et al., 1996; Kilian, 2009). Greenspan (2004) opined that the impact of oil prices alone in the present capitalist economies is difficult to deduce however McKillop (2004) argued that increasing oil prices will reduce economic growth, lead to panics in the stock market and produce inflation, which will eventually create monetary and financial instability. Aliyu (2009) supported this view, noting that this will lead to increased interest rates and finally a recession. According to Adebiyi et al. (2009) the last year has witnessed systemic crisis in the global financial markets which has caused serious concerns for policy makers and financial experts. Since the 2007 crisis, the financial market has observed unusual fall down in financial institutions, loss in asset value/share price, fall in stock markets, speculative bubbles and currency predicament, among others. Nigeria, in particular has observed unexpected fall in oil prices that dropped to US$40 in 2009 from US$147 in July 2008 (dollar values are per barrel). There has also been depreciation of currency from N118 to N145 per US dollar (official rate) in the country within the period.

The research would facilitate to understand the bond between share prices, oil prices, exchange rate and world market index. These factors are the indicators of an economy performance hence it would be of interest for an economist and a common man alike to know if the above three factors predict the weak performance of the stock market or otherwise.

The questions arise if the change in oil prices can affect the stock prices. Furthermore do stock prices respond to changes in exchange rate? Moreover can the variability in stock prices be adequately explained by changes in oil prices, exchange rate and world market index? Most of the work of previous studies looked into the relationship on a two-variable framework, between exchange rates and stock prices or oil price and stock prices, other researchers have revealed that adopting such framework can be considered ambiguous due to the oversight of a third variable such as exchange rate. In the stock market exchange rates can act as a channel that magnifies the change in oil price (Adebiyi et al., 2009).

This paper further investigates the interaction between oil prices, exchange rate, world market and the stock market. This research adopts the four variables of Killian and Park (1999) with monthly data for oil price, exchange rate, world market index and Nigerian stock market were adopted while oil price shock is defined as the annual change in oil price. The research is in five sections. Section 1 introduces the study followed by literature review. Section 3 includes data and research methodology. Section 4 presents analysis of results. Section 5 concludes the research.

2. Literature Review

2.1 Impact of Oil Price on the Global Economy

Nigeria, though a developing economy has crude oil as its most important source of revenue, energy and foreign exchange, over the last thirty years. Nigeria's exports account for 90% of oil and 80% of government revenue. It is imperative to note that energy, financial markets and the economy are all unambiguously related in the course of country's economic growth (Basher and Sadorsky, 2006). Sukcharoen et al. (2014) oil consuming countries like US and Canada signify reasonably strong dependence on oil price series associating this exception to its size of consuming oil; whereas other results for various countries suggest a weak dependence of prices and stock indices for most cases. The prelude of Euro changed considerably linking oil prices and stock returns increasing dependence amongst the two variables. Abdelaziz et al. (2008) argue stock markets get impacted in different ways by falling oil prices, depending on the country's position on the oil supply/demand chain (oil importer or exporter). Increase in world oil price improves the balance of trade of oil exporting countries thereby creating a surplus, improves net foreign asset position and raises stock prices thereby causing currency appreciation.

The global financial crisis, which elicited by the credit crunch within the US sub-prime mortgage market has however left its impact on the Nigerian oil sector, the rationale behind this is revenue from oil is used by the country to finance its budget and the countries that are mostly hit by the crisis are the primary market for the country's oil (Adamu, 2009). Nigerian stock market (NSM) has proven to be one of the most efficient in terms of profitability as it posted one of the highest annual returns in 2007. However NSM was not immune to the shocks of 2007 financial crisis .Despite the fact that it did better than most other stock exchanges, the global financial crisis impacted the performance of the Nigeria Stock Exchange to the extent that market capitalization fell by 45.8% in 2008 (Ajakaiye and Fakiyesi, 2009).

There is dearth of literature regarding the developing economies as majority of the work done to date have focused on developed economies. This research studies a developing economy and contributes in the shortage of literature. The amalgamation of these four variables will assist to raise indulgent of the relationship among oil prices, emerging market stock prices and exchange rates. The study estimates the effects of changes in oil price, movements in exchange rate and the world marker index have on stock returns of Nigeria.

2.2 Relationship between Stock Prices and Oil Prices

Studying Nigerian Stock Exchange, Fowowe (2013) found an insignificant negative relation of oil prices on stock returns. The rationale behind this can be possibly the domination of banking sector in stock exchange rather than oil-related firms to justify a channeling of high oil prices to the stock market; or because of the high transactions costs on the stock exchange which discourages investment; or because of low liquidity on the stock exchange. Kilian (2009) investigated the relationship between stock prices in United States and oil prices. Four variables have been under study (the percentage change in world crude oil production, global real economic activity, the real oil price, and return on U.S. stocks) and found that decline in the oil demand does lower the stock prices but decline in oil supply have condensed influence on stock prices. Apergis and Miller (2009)

used a SVAR and revealed that oil market fright does not have a noteworthy effect on the stock prices.

Oil prices have significant relationship with Nigerian stock market in the long run (Nwosa, 2014). In the episodes of significant economic havoc Filis et al. (2011) found that the oil market is not a "safe haven" for contributing hedge against stock market losses. Hamao (1989) used Japanese equity data and found no support of oil price factor. Kaneko and Lee (1995) did support oil price impacting stock returns on Japanese data.

In theory, oil prices are associated to share prices in numerous conducts. A bridge between oil prices and stock prices can be direct that will impact future cash flows or it can have an indirect route where by affecting interest rate can be used to discount future cash flows. Huang et al. (2005) revealed that when oil prices change and volatility go beyond a doorsill, they show a significant explanatory power for the effect of economic variables e.g. industrial production and stock market returns. Covering the period of 2000- 2012, Kopytin (2014) found that oil prices have not been a systematic risk factor for Russian and Norwegian stock market indices. However Sahu (2014) while studying the era of 2001- 2013 uncovered that Indian stock market and crude oil prices are highly exogenous and a positive shock in oil price has a small but persistence positive impact on Indian stock markets in short run.

Adebiyi et al. (2009) noted that the understanding of linkage between oil price, exchange rate and stock markets can help in the anticipation of an economic crisis and reported a negative relation between stock and oil prices. Basher et al. (2011) observed a positive relationship between stock prices and oil prices. Ozturk et al. (2008) found the effect of oil price shocks on the exchange rate would be determined by the distribution of oil imports in oil importing economies.

2.3 Relationship between Stock Prices, Oil Prices and Exchange Rates

The connection of stock prices and market exchange rates have been of major interest to economists as they both have vital role in helping the economy's growth (Aydemir and Demirhan, 2009). An increase in value of the local currency, for instance, does not make export attractive thereby reducing foreign demand, revenue for the firm and a fall in firm value. It will also cause share prices to fall (Gavin, 1989). The portfolio balance models, in which the significance of capital account transactions is important is another way to evaluate the relationship between exchange rates and stock prices. For example, a vivacious stock market would pull towards capital from foreign investors hence the demand for its currency will increase. The opposite would be true with decrease in share prices where the investors try to exit the market by sell their shares to get rid of additional losses and exchange their money into foreign currency thereby depreciating the currency (Adebiyi et al., 2009). (Koranchelian) 2005 found that a 1% rise in oil price led to 0.2% increase in real exchange rate. Exchange rates fluctuations do impact oil prices (Basher et al., 2011; Sadorsky, 2000) thus, stock prices variations do impact exchange rates and money demand because investors' wealth and liquidity demand is determined by stock market performance (Mishra, 2004).

Nieh and Lee (2001) observed that there is no stable linkage of stock prices and exchange rates in the long-run. Nonetheless significant relationship has been established in the short-run for few countries. The variations in these outcomes can be explicated by each country's distinction in economic stage, government policy, expectation pattern, etc. Kim

(1992) showed negative relationship and (Ozair, 2006) found no relationship between stock prices and exchange rates.

3. Data and Methodology

The sample data covers the company level data from the period of 2001 to 2011. The period and company data level was chosen for two reasons (1) availability of data and (2) in recent times there has been a lot of literature on the impact of global financial crisis has on international oil market and exchange rates. Although, some earlier works have covered this period either in part or in full (Adebiyi et al., 2009; Basher et al., 2011; Kilian, 2009) their conclusions however differ.

Monthly data analysis was adopted over a ten years period. The time period chosen is to eliminate short term bias thereby ensuring that the observed relationship holds true regardless of economic changes and stock market booms or crash. The data on share prices and world market index were collected from Datastream while data on exchange rates were sourced from OandA website, oil price data was from US energy information administration. The oil price data used is the Bonny oil field price data, as Nigeria has two commercial sized oil fields, the Forcado and the Bonny oil field, the Bonny oil field data was used as this is the bigger of the two oil fields.

An examination of the monthly changes in share price of all thirty Nigerian companies, covering five sectors, Banking(8), Insurance(3), Food producers(9), oil and gas(9) and transportation(1) over a ten years period were taken (see appendix I). In addition to this, the monthly changes in exchange rate of the NGN to the USD, the monthly changes in the world market index and the monthly changes in the International prices of the Nigerian Bonny oil field oil prices were examined in the chosen period. This gives a total of 121 observations per variable observed, hence a total of 484 monthly data were collected.

Since the intent of this study is to check the effect of the variables on the stock prices therefore to check the impact of each variable it is appropriate to run multivariate regression model with the F-test, T-test and critical value approach were adopted to test for significance and make a decision on the following research hypotheses;

- $\mathbf{H_1}$: There is a relationship between share prices and oil prices, exchange rates and world market index.
- $\mathbf{H_2}$: There is a relationship between share prices and oil prices
- $\mathbf{H_3}$: There is relationship between share prices and exchange rates

Favoring Sadorsky (1999) method, monthly data on the four variables analyzed were gathered and regression model was computed on the average monthly change of each of the variable. The average monthly change computation is represented by the equation:

1)	monthlyΔ =	Price of month 2 – price of month 1	(for oil price and share price) (i)
		Price of month 1	
2)	monthlyΔ =	Rate of month 2 – rate of month 1	(for exchange rate) (ii)
		Rate of month 1	
3)	monthlyΔ =	Index of month 2 – Index of month 1	(for exchange rate) (iii)
		Rate of month 1	

The multivariate regression equation which describes how the mean value of y is related to x1, x_2, x_3……..x_i is;

$E(y) = \beta 0 + \beta 1x1 + \beta 2x2 \ldots\ldots\ldots \beta ixi + \alpha$ (iv)

The Excel Linest formula is used to compute sample statistics b_0, b_1, b_2…….b_i that will be used as the point estimators of the parameters β_0,β_1,β_2……β_i.

$\hat{y} = b_0 + b_1x_1 + b_2x_2 + \ldots\ldots b_ix_{i+} \alpha$ (v)

y = observed value of the dependent variable for the i_{th} observation

$\hat{y}$ = estimated value of the dependent variable for the i_{th} observation

β_0 = is the intercept of the y slope i.e. the expected value of y when all x equal zero

β_1, $\beta_{2\ldots}$ β_i = is the slope coefficient of x_1, $x_{2\ldots..}$ x_i i.e. an estimate of the change in y corresponding to a one unit change in either x_1, $x_{2\ldots...}$ x_i when all other independent variables are held constant.

α = error term.

3.1 Variables

Ŷ (Dependent variable) = Stock prices of thirty (30) Nigerian companies, quoted on the NSE.

Independent variable $\square_1$ = Exchange rate of NGN to USD

Independent variable $\square_2$ = Nigerian Bonny field oil price

Independent variable; $\square_3$ = World market indices

4. Results

4.1 Data Analysis

Augmented Dickey-Fuller (ADF) unit root test is used to check data stationarity for all the variables. There was found no unit root (rejection of H_0 at 1% level) as the absolute ADF test statistics is greater than all the critical values 1%, 5% and 10%. Using ADF will leave no concerns for autocorrelation. Similarly there found no multicolinartiy as Variance inflation factor (VIF) test meets the benchmark value of 10 for each variable. The significant values of Bera- Jarque statistics show the goodness of fit of skewness and kurtosis matching a normal distribution at 1% significance level.

The results derived from the multivariate regression models on thirty (30) different Nigerian companies, measuring their relationship to international oil prices, NGN to USD exchange rate and the world market index are presented below. The relationship is measured per organization and results interpreted per organization, per sector and an overall relationship amongst the variables. These results are tested for significance using the F-test and t-test.

The monthly change in stock prices, exchange rate, oil prices and world market index from 2001-2011 were used in deriving the multivariate regression results. These monthly data were analyzed using the Excel Linest and the results as in Table 2 (see appendix II) which shows the calculated slope coefficient of $\square_1$ (exchange rate), $\square_2$ (oil prices) and $\square_3$ (world market index) as m_1, m_2, m_3, the derived standard error of $\square_1$, $\square_2$, $\square_3$, the computed F observed value, degree of freedom (df), coefficient of determination (R^2) and slope (β) for each of the thirty (30) companies.

4.2 Analysis of Regression Results

From the results of the slope coefficient (m_1,m_2,m_3) for the 30 companies, 2 of these companies (Eterna oil and Nigeria flour) belonging to different sectors showed positive relationship to exchange rate while the other 28 companies showed negative relationship to exchange rate. Considering the sheer volume of the companies showing a negative relationship i.e. over 93% of the sample, holding all other factors constant, it can be asserted that share prices of Nigerian companies respond negatively to changes in exchange rate. Hence, share prices increase when the Naira appreciates against the American dollar.

In contrast to the observed relationship on exchange rates, 36.67% of the sample size i.e. 11 companies showed negative relationship to both oil prices and the world market index, while the other 19 companies displayed positive relationship to these variables, which is in direct contrast with the results of (Adebiyi et al., 2009). Holding all other factors constant, it can be asserted that share prices of Nigerian companies respond positively to the world market and oil prices. Hence, share prices increase when the world market improves; share prices also increase with oil prices.

When the relationship between share prices, oil prices and world market index were observed on the basis of sector, it was observed that;

a) Of the eight banks, just one showed a negative relationship to both world market and oil prices i.e. 12.5% of the sample. It can therefore be asserted that Nigerian banks react positively to world market and oil prices, all other factors being held constant.

b) Of the nine oil and gas companies, five showed a negative relationship to both world market and oil prices i.e. 55.56% of the sample. It is easy to conclude that Nigerian downstream oil and gas companies react negatively to world market and oil prices, all other factors being held constant, however, the sample of nine companies is too small for this assertion to hold true.

c) Of the nine food producers, four showed a negative relationship to both world market and oil prices i.e. 44.44% of the sample. It can be said that Nigerian food producers, particularly those in the primary market segment (all three in the secondary segment gave negative results) react positively to world market and

oil prices, all other factors being held constant.

d) The three insurance companies observed showed positive results.

e) The transportation company gave a negative result, this result is however not conclusive as a sample of one company within this sector cannot confidently give a true result.

4.3 F – TEST

The F_{act} values were derived by the Excel Linest and the results in Table 3 (see appendix III) were arrived at while the Fα is derived from the F statistical table, α at 0.05. The reason to conduct this test is to establish a relationship between the dependent variable and the set of all the independent variables.

The results show that only four companies (two from banking sector and two from food producers) reject the F-test at 95% significance level i.e. 13.33% of the sample. This shows interconnectivity between Nigerian stock prices and exchange rate, oil prices and the world market, hence supports (Koranchelian, 2005; Pindyck and Rotemberg, 1991; Sadorsky, 2000).

4.4 t – Test

The t_{act} values were derived by dividing the slope coefficient (m_1, m_2, m_3) by the standard error, this is then compared to the tα, to test if the null hypotheses holds for the individual coefficients. Rejecting H_0 for a coefficient, means there is no relationship between that coefficient and stock prices of that particular company.

4.4.1 Discussion of t-Test Results

The results show that five companies (16.67%) reject the H_0 for t_{act1} while two companies (6.67%) reject the H_0 for t_{act3} and all companies accepted the H_0 for t_{act2} at 95% level of significance. The results for FBN, flourmill, livestock and UBA are quite consistent with the F-test results which also rejected the H_0 thereby evidencing the lack of a relationship between at least one of the variables, which for the first three is exchange rate while for UBA it is world market index. Hence, it is not 95% certain that a negative relationship exists between the stock prices of these companies and the NGN to USD exchange rates.

The results for Access-bank, Afri-bank and UBN are however quite puzzling as the F-test result on these companies suggests a relationship amongst all variables. This however negates the t-test findings, with Afri bank and UBN rejecting the H_0 for t_{act1} i.e. exchange rate and Access bank rejecting the H_0 for t_{act3} i.e. world market index, at a 95% level of confidence. Correlation between the independent variables might offer an explanation for this.

Out of the thirty (30) companies being observed, only seven (7) had results rejecting H_0 for at least one of the t-test variables i.e. 23.33%. It can therefore be concluded that Nigerian stock prices react to changes in exchange rate, oil prices and the world market index. This is consistent with the findings of (Koranchelian, 2005; Sadorsky, 2000; Lizardo and Mollick, 2010; Chen and Chen, 2007; Huang and Guo, 2007). This study however cannot determine the extent of the relationship i.e. positive or negative.

4.5 Discussion of Main Findings

The results support the work of Pindyck and Rotemberg (1991) and Sadorsky (2000) showing a strong relationship between share prices and exchange rate as all but five

companies showed this in the t-test results. Of these five companies, three are banks and two food producers. The relationship between these variables is also negative as all but 2 companies showed this in the regression test. Fowowe (2013) also found negative but insignificant effect of oil prices on stock returns. It will however be interesting to know what the results will be if more banks are included in the research as the margin of decision is quite low, considering there are just eight banks in the sample.

The next set of results are consistent with (Adebiyi et al., 2009; Basher et al., 2011; Kaneko and Lee, 1995; Ferson and Harvey, 1995) in that variation in stock market is explained by oil price volatility as all thirty companies showed a relationship with oil prices in the t-test at 95% level of confidence. The results however reflect over 63% positive relationship between share prices and oil prices confirming Sahu (2014) results but contrasting the negative relationship by Adebiyi et al. (2009). It should however be noted that they covered a longer time period i.e. 1985- 2008. Also, 55.56% of the oil and gas companies sample data, showed a negative relationship to both world market and oil prices. Sukcharoen et al. (2014) found weak evidences of oil price dependence on stock returns. The conclusion that Nigerian downstream oil and gas companies react negatively to world market and oil prices can however not be made as the margin is too close. This study can however not conclude on the extent of these relationships i.e. negative or positive for both variables as only 36.67% of the sample size showed a negative relationship.

5. Conclusion

This research work is aimed at contributing to the works of investors in the understanding of the distinction between the stock market and the oil and gas industry when making investment decisions. This research gives an understanding of how the overall price level change in fuel prices affects the performance of stocks, aids in the knowledge of the size of the effect of this on major sectors of the Nigerian economy i.e. either equal impact or if some sectors are likely to be more impacted than others.

The results obtained will positively impact future investment decisions and aid policymakers, not only in Nigeria but also amongst all oil producing economies. The results obtained will aid investors in determining if stock market can serve as a proxy for investing in oil and gas or if both markets are independent of each other and knowledge obtained can help in the avoidance of economic disaster.

A majority of the work done to date have focused on developed economies. This study studies a developing economy and contributes in the already existing literature by analyzing the effects of changes in oil price, movements in exchange rate and the world marker index have on the real stock returns of Nigeria from 2001– 2011 using multivariate regression analysis. The study employed the use of the statistical F-test and T-test to analyze data on thirty companies within a ten year timeframe. The analysis was done on annual changes observed on the individual variables.

Of thirty companies examined only four (FBN, UBA, Flourmill, and Livestock) fail the F test at 95% confidence level, pointing to strong Nigerian stock market correlation with the independent variables. The t test results show that all but seven companies correlate to the three variable and none fail the test on more than one variable. This confirms strong stock market correlation between Nigerian stock market and the three independent variables.

The results in this paper confirm that there is a relationship between share prices and oil prices, exchange rates and world market index. There is a negative relationship between share prices and exchange rates, the extent of the relationships between oil prices and world market index is however not supported.

5.1 Managerial Implications

The study would enhance the understandings of the interaction between oil price volatilities and emerging stock market performances. This would enable foreign investors who are interested in Nigerian stock market helps in understanding the relationship between the variables. Stock market can therefore be said to serve as a proxy for oil prices, as all companies within the sample supported this evidence. Over 63% of the sample showed a positive relationship, thereby suggesting that investing in stock prices may be just as good as investing in oil prices and vice versa, this is however not conclusive. It could also be of interest to policymakers to note that policies made on exchange rates have direct relationship with the stock market as an appreciation of the Naira leads to fall in share prices and vice versa.

It is wise to consider international and domestic oil price changes by policymakers, financial analyst and shareholders while making financial decisions, as these variable notably impact stock prices of Nigeria. Nigerian stock market is not independent of the world market hence both policymakers and investors in the Nigerian market need to be mindful of the activities in the international market. This result supports a positive relationship with the world i.e. a crisis in the international market will mean a crisis in the Nigerian market, as evidence during the last financial crisis. This is however not conclusive.

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Appendix I

Table 1: Company Names and Sectors

Company name	Sector
ACCESS BANK	Banking
AFRIBANK	Banking
FBN	Banking
GTB	Banking
UBN	Banking
UBA	Banking
WEMA	Banking
FINBANK	Banking
FORTEOIL	Oil and gas
AFROOIL	Oil and gas
CAPITAL OIL	Oil and gas
ETERNA OIL	Oil and gas
MRS OIL	Oil and gas
OKOMU OIL	Oil and gas
RAK OIL	Oil and gas
TOTAL OIL	Oil and gas
TROPICAL OIL	Oil and gas
CADBURY	Food producers
ELLA LAKES PLC	Food producers
FLOURMILL	Food producers
LIVESTOCK	Food producers
NATSALT	Food producers
NESTLE	Food producers
NIG FLOUR	Food producers
P.S. MANDRIDES COMPANY PLC	Food producers
DICON SALT	Food producers
AIICO INS	Insurance
AMICABLE INS	Insurance
BRIT AME INS	Insurance
TRANSEXPRESS	Transportation

Appendix II
Table 2: Regression Results

	Companies	M_1	M_2	M_3	SE_1	SE_2	SE_3	F	R^2	DF	B
1	ACCESS BANK	-1.2952	0.0419	0.6960	0.7557	0.1842	0.3317	2.5660	0.0622	116	0.0321
2	AFRIBANK	-1.7250	-0.0260	0.2339	0.6377	0.1554	0.2799	2.6251	0.0635	116	0.0054
3	FBN	-1.0904	0.1357	0.1451	0.4516	0.1100	0.1982	3.0904	0.0740	116	0.0002
4	GTB	-0.7997	0.1520	0.1961	0.4740	0.1155	0.2080	2.2498	0.0549	116	0.0144
5	UBN	-1.1391	0.1129	0.2504	0.5536	0.1349	0.2430	2.2992	0.0561	116	-0.0092
6	UBA	-0.8533	0.1667	0.7548	0.7057	0.1720	0.3097	3.2835	0.0782	116	0.0084
7	WEMA	-1.1088	0.1770	0.0425	0.7456	0.1817	0.3272	1.2532	0.0313	116	0.0148
8	FINBANK	-1.8464	0.3293	0.1988	1.0190	0.2484	0.4472	2.1134	0.0518	116	0.0167
9	FORTEOIL	-0.5710	0.1633	-0.0675	0.8781	0.2140	0.3854	0.3947	0.0101	116	0.0224
10	AFROOIL	-1.9060	-0.2414	-1.6579	4.2241	1.0297	1.8540	0.4007	0.0102	116	0.1666
11	CAPITAL OIL	-0.7549	-0.1452	-0.4245	0.8140	0.1984	0.3573	1.0705	0.0269	116	0.0277
12	ETERNA OIL	1.3129	0.1490	-0.0133	1.2623	0.3077	0.5540	0.4020	0.0102	116	0.0427
13	MRS OIL	-0.5053	-0.0314	0.0272	0.5260	0.1282	0.2309	0.3111	0.0079	116	0.0103
14	OKOMU OIL	-0.1032	-0.0652	0.0962	0.5312	0.1295	0.2331	0.1207	0.0031	116	0.0117
15	RAK OIL	-0.0055	-0.0021	-0.0033	0.0115	0.0028	0.0050	0.4754	0.0121	116	0.0003
16	TOTAL OIL	-0.0841	0.0138	-0.0273	0.4292	0.1046	0.1884	0.0272	0.0007	116	0.0155
17	TROPICA OIL	-0.0047	0.0166	0.0132	0.0755	0.0184	0.0331	0.4042	0.0103	116	0.0030
18	CADBURY	-0.2745	-0.1650	0.2111	0.5819	0.1418	0.2554	0.5929	0.0151	116	0.0120
19	ELLALAKESPLS	-1.2308	-0.4652	0.9778	1.7275	0.4211	0.7582	0.8802	0.0222	116	0.0654
20	FLOURMILL	-2.2025	0.2461	0.2576	0.5356	0.1305	0.2350	8.3887	0.1782	116	0.0249
21	LIVESTOCK	-1.6748	0.3202	-0.1235	0.7773	0.1895	0.3411	2.9380	0.0706	116	0.0002
22	NATSALT	-0.6904	1.1473	-0.8070	3.7650	0.9178	1.6525	0.5878	0.0149	116	0.0814
23	NESTLE	-0.0947	-0.9318	1.4490	3.4279	0.8356	1.5045	0.6081	0.0154	116	0.1077
24	NIG FLOUR	0.0435	0.2324	0.4923	0.6528	0.1591	0.2865	2.1522	0.0527	116	0.0154

25	MANDRIDES	-0.3096	-0.0167	-0.2410	2.4442	0.5958	1.0728	0.0248	0.0006	116	0.0523
26	DICON SALT	-0.4154	0.1125	0.3636	0.8314	0.2026	0.3649	0.6355	0.0161	116	0.0042
27	AIICO INS	-0.6932	0.3197	-0.0939	0.9095	0.2217	0.3992	1.0215	0.0257	116	0.0101
28	AMICABLEINS	-0.1183	0.0095	0.0548	0.4650	0.1133	0.2041	0.0532	0.0013	116	0.0112
29	BRIT AMENS	-0.1198	0.1462	-0.2448	0.6841	0.1667	0.3002	0.4322	0.0110	116	0.0237
30	TRANSEX PRESS	-0.4573	-0.0063	-0.3563	0.7466	0.1820	0.3277	0.5650	0.0144	116	0.0280

Appendix III

Table 3: F-Test Results and Decision On H_0

Companies	**F- Value**	**Decision**
ACCESS BANK	2.566085196	Accept H_0
AFRIBANK	2.625155959	Accept H_0
FBN	3.090490096	Reject H_0
GTB	2.249884075	Accept H_0
UBN	2.299286732	Accept H_0
UBA	3.283563387	Reject H_0
WEMA	1.253282649	Accept H_0
FINBANK	2.113458733	Accept H_0
FORTEOIL	0.394743115	Accept H_0
AFROOIL	0.400720992	Accept H_0
CAPITAL OIL	1.070545578	Accept H_0
ETERNA OIL	0.40209423	Accept H_0
MRS OIL	0.311176447	Accept H_0
OKOMU OIL	0.120786904	Accept H_0
RAK OIL	0.475416171	Accept H_0
TOTAL OIL	0.027297639	Accept H_0
TROPICAL OIL	0.404269349	Accept H_0
CADBURY	0.592914107	Accept H_0
ELLA LAKES PLS	0.880271588	Accept H_0
FLOURMILL	8.388716126	Reject H_0
LIVESTOCK	2.938003659	Reject H_0
NATSALT	0.587875664	Accept H_0
NESTLE	0.608163364	Accept H_0
NIG FLOUR	2.152209636	Accept H_0

MANDRIDES	0.024813683	Accept H_0
DICON SALT	0.635540348	Accept H_0
AIICO INS	1.021512285	Accept H_0
AMICABLE INS	0.053292752	Accept H_0
BRIT AME INS	0.432209474	Accept H_0
TRANSEXPRESS	0.565095978	Accept H_0

Appendix IV

Table 4: t-Test Results

Companies	**t- value**	**Decision**
ACCESS BANK	t_{act1}: -1.714	Accept H_0
	t_{act2}: 0.227	Accept H_0
	t_{act3}: 2.099	Reject H_0
AFRIBANK	t_{act1}: -2.705	Reject H_0
	t_{act2}: -0.167	Accept H_0
	t_{act3}: 0.835	Accept H_0
FBN	t_{act1}: -2.415	Reject H_0
	t_{act2}: 1.233	Accept H_0
	t_{act3}: 0.732	Accept H_0
GTB	t_{act1}: -1.687	Accept H_0
	t_{act2}: 1.316	Accept H_0
	t_{act3}: 0.943	Accept H_0
UBN	t_{act1}: -2.058	Reject H_0
	t_{act2}: 0.837	Accept H_0
	t_{act3}: 1.031	Accept H_0
UBA	t_{act1}: -1.209	Accept H_0
	t_{act2}: 0.969	Accept H_0
	t_{act3}: 2.437	Reject H_0
WEMA	t_{act1}: -1.487	Accept H_0
	t_{act2}: 0.974	Accept H_0
	t_{act3}: 0.129	Accept H_0
FINBANK	t_{act1}: -1.812	Accept H_0
	t_{act2}: 1.326	Accept H_0
	t_{act3}: 0.445	Accept H_0
FORTEOIL	t_{act1}: -0.650	Accept H_0
	t_{act2}: 0.763	Accept H_0
	t_{act3}: -0.175	Accept H_0

AFROOIL	t_{act1}: -0.451	Accept H_0
	t_{act2}: -0.234	Accept H_0
	t_{act3}: -0.894	Accept H_0
CAPITAL OIL	t_{act1}: -0.927	Accept H_0
	t_{act2}: -0.732	Accept H_0
	t_{act3}: -1.188	Accept H_0
ETERNA OIL	t_{act1}: 1.040	Accept H_0
	t_{act2}: 0.485	Accept H_0
	t_{act3}: -0.024	Accept H_0
MRS OIL	t_{act1}: -0.961	Accept H_0
	t_{act2}: -0.245	Accept H_0
	t_{act3}: 0.118	Accept H_0
OKOMU OIL	t_{act1}: -0.194	Accept H_0
	t_{act2}: -0.503	Accept H_0
	t_{act3}: 0.413	Accept H_0
RAK OIL	t_{act1}: -0.479	Accept H_0
	t_{act2}: -0.752	Accept H_0
	t_{act3}: -0.655	Accept H_0
TOTAL OIL	t_{act1}: -0.196	Accept H_0
	t_{act2}: 0.132	Accept H_0
	t_{act3}: -0.145	Accept H_0
TROPICAL OIL	t_{act1}: -0.063	Accept H_0
	t_{act2}: 0.902	Accept H_0
	t_{act3}: 0.399	Accept H_0
CADBURY	t_{act1}: -0.472	Accept H_0
	t_{act2}: -1.163	Accept H_0
	t_{act3}: 0.827	Accept H_0
ELLA LAKES PLS	t_{act1}: -0.712	Accept H_0
	t_{act2}: -1.105	Accept H_0
	t_{act3}:1.289	Accept H_0
FLOURMILL	t_{act1}: -4.11	Reject H_0
	t_{act2}: 1.885	Accept H_0
	t_{act3}: 1.096	Accept H_0
LIVESTOCK	t_{act1}: -2.155	Reject H_0
	t_{act2}: 1.690	Accept H_0
	t_{act3}: -0.362	Accept H_0
NATSALT	t_{act1}: -0.183	Accept H_0
	t_{act2}:1.250	Accept H_0

	t_{act3}: -0.488	Accept H_0
NESTLE	t_{act1}: -0.0276	Accept H_0
	t_{act2}: -1.115	Accept H_0
	$t_{act3:}$ 0.963	Accept H_0
NIG FLOUR	t_{act1}: 0.067	Accept H_0
	t_{act2}:1.461	Accept H_0
	$t_{act3:}$1.718	Accept H_0
MANDRIDES	t_{act1}: -0.127	Accept H_0
	t_{act2}: -0.028	Accept H_0
	t_{act3}: -0.225	Accept H_0
DICON SALT	t_{act1}: -0.499	Accept H_0
	t_{act2}: 0.555	Accept H_0
	t_{act3}: 0.997	Accept H_0
AIICO INS	t_{act1}: -0.762	Accept H_0
	t_{act2}: 1.442	Accept H_0
	t_{act3}: -0.235	Accept H_0
AMICABLE INS	t_{act1}: -0.254	Accept H_0
BRIT AME INS	t_{act1}: -0.175	Accept H_0
	t_{act2}:0.877	Accept H_0
	t_{act3}: -0.815	Accept H_0
TRANSEXPRESS	t_{act1}: -0.613	Accept H_0
	t_{act2}: -0.035	Accept H_0
	t_{act3}: -1.0874	Accept H_0