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# Empirical Proof of the CAPM with Higher Order Co-moments in Nigerian Stock Market: The Conditional and Unconditional Based Tests

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## Abstract

This study examines the significance of the risk factors in the CAPM with higher order co-moments using a two-pass methodological technique of Fama and Macbeth. Stock prices of 53 companies out of the 207 listed in Nigerian Stock Exchange (NSE) for a sample period January 2003 to December 2011 are analyzed. The study particularly augments the model using unconditional and conditional information. The unconditional test reveals that only the co-skewness risk is priced while the covariance and co-skewness demonstrate weak relationship with asset returns; while the conditional test shows that all the risk factors in the up-market are not priced but the covariance and co-skewness risk play significant role in explaining asset returns in the down-market phase. However, the conditional information has improved the descriptive ability of the model.

**JEL classification numbers**: C4; D4; D8; E4; G1
**Keywords**: CAPM, Higher order Co-moments, Nigeria stock market

## 1 Introduction

The thought of considering a risk factor that influences the return of investors in a stock market is ushered in to a limelight by (Sharpe, 1965). He develops the Capital Asset Pricing Model, popularly known as the CAPM which explains that beta is the only risk factor determining the variations in asset prices/returns and that the other factor is unique

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which can be eliminated through diversification. Therefore, in the CAPM's world only the risk free rate and market portfolios exist leading to the claim that the market portfolio is mean-variance efficient. However, the time series tests of (Friend & Blume, 1970), (Black, Jensen & Scholes, 1972) and Stambaugh (1982) confirm the relationship between return and beta risk to be too flat suggesting the needs to identify other market factors that could as well influence changes in expected return.

Partly in response to this research quandary, Kraus and Litzenberger(1976) develop the skewness preference asset pricing model which extends the traditional CAPM to include the third moment called the systematic skewness factor. In the same spirit of improving upon the descriptive ability of the CAPM, Fang and Lai (1997) introduce the co-kurtosis factor into the Kraus and Litzenberger's pricing equation. This sophisticated relation is now known as the CAPM with higher order co-moments (CAPMC). Thus, the CAPMC presents intuitive positive relationship between mean return and a set of market factors which are covariance, co-skewness and co-kurtosis risks. The underlying assumption of the CAPMC is that there are additional two risk factors besides beta risk that can neither be reduced nor eliminated through diversification; these factors are systematic and command risk premium in the capital market. The subsequent tests of the CAPMC have been mixed to date. For example, Harvey and Siddique (1999) present some extensive analysis of the effect of coskewness on asset prices. They reveal that coskewness contributes to part of the explanatory power of size and value factors of Fama and French's (1993) study, and that coskewness can explain part of return to momentum trading strategies which are largely unexplained by these factors. Harvey (2002) shows that coskewness, and cokurtosis systematic risks are significantly priced in the individual emerging markets but not in the developed markets. In the same token, Dittmar (2002) examines the importance of co-kurtosis. He includes the additional condition of decreasing absolute prudence, which suggests that individual agents are systematic kurtosis risk averse and concludes that the co-variance, co-skewness, and co-kurtosis respectively influence asset returns to different magnitudes. However, Hung, Shackleton and Xu (2004) confirm weak evidence of co-skewness and co-kurtosis as they display insignificant t-statistics and the adjusted R-squares does not materially improve the unconditional CAPMC.

Ferson and Harvey (1999) loosely assert that many multifactor specifications such as the CAPMC are rejected due to the fact that they ignore conditioning information. Therefore, several studies such as Harvey and Siddique (2000), Chiao, Hung and Srivastava (2003) and Galagedera and Maharaj (2004) demonstrate that the inclusion of conditional information into the four moments CAPM fundamental pricing error has improved the explanatory power of the model. Therefore, this study intends to augment the CAPMC with conditional information so as to examine if the investors in Nigerian capital market are rewarded for taken the non-diversifiable systematic co-skewness and co-kurtosis risks. Also the study represents the first attempt in extending the CAPMC to Nigeria with the aim of testing if the model will improve the descriptive power of the CAPM which was hitherto tested using Nigerian monthly stock prices by (Arewa, 2008). The rests of the paper are organized as: literature review, methodology and data, results, conclusion and recommendations.

## 2 Literature Review

Kraus and Litzenberger (1976) extend the mean- variance capital asset pricing model by including the effect of Skewness on assets' returns variation. Their specification expresses that average return is linear in systematic covariance and systematic skewness respectively. They argue that the slope of the unconditional CAPMC is lower and the intercept is higher than predicted. If an investor prefers positive co-skewness, these authors discover that the inclusion of systematic skewness factor to the unconditional model yields an intercept value equivalent to the risk-free rate. Therefore they suggest that only systematic skewness, not total skewness, should be used in an asset pricing model analogous to the systematic risk of beta used in the CAPM. Similarly, Friend and Westerfield (1980) find that the slope coefficient of systematic skewness is significantly different from zero, implying that systematic skewness can be priced. However, the intercept is significantly different from zero, indicating that the value is not equal to the risk-free rate. This inconsistency is said to have stemmed from a different period of observation and the composition of asset classes used to calculate market returns. Chen (1980,p.8) observed that if the asymptotic APT model presents two factors to be significantly priced, then the Kraus and Litzenberger (1976) pricing equation above can be derived. Apart from systematic skewness test, Fang and Lai (1997) develop a four-moment CAPM that includes systematic variance; systematic skewness and systematic kurtosis to the risk premium of an asset. Javid and Ahmad (2008) reveal that standard CAPM does not explain the risk return trade-off adequately; however the conditional model has better performance in explaining risk-return relationship. Their empirical investigation of conditional high order co-moments in explaining the cross-section of asset return show that conditional systematic skewness is a significant determinant of asset pricing while conditional systematic variance and conditional systematic kurtosis exert limited influence in explaining the asset price relationship. Also, Christie-David and Chaudhry (2001) show that the third and fourth moments explain the return-generating process in futures markets significantly well. Investors are generally rewarded for taking high risk as measured by high systematic variance and systematic kurtosis. Likewise, investors forego the expected returns for taking the gains of a positively skewed market. Arditti (1971) also has documented that skewness and kurtosis cannot be diversified away by increasing the size of holdings. Harvey and Siddique (2000) investigate an extended version of the CAPM by including systematic co-skewness. Their specification incorporates conditional skewness. The extended form of the CAPM is preferred as the conditional skewness captures asymmetry in risk, in particular downside risk which has recently become considerably important in measuring value at risk. They however report that conditional skewness explains the cross-sectional variation of expected returns. Dittmar (2002) investigates the empirical relevance of using co kurtosis as pricing factor. The author includes the additional condition of decreasing absolute prudence, indicating that individual agents are averse to kurtosis risk. Therefore the asset returns are influenced by co-variance, co-skewness, and co-kurtosis. He employs an alternative technique called pricing kernel to compare the pricing errors between the nonlinear pricing kernel adding effect of co-kurtosis and linear pricing kernels constructed from factor models. The non-linear pricing kernel is able to price the cross-sectional returns much better than the three-factor model. Moreover, the significance of size and value factors could be sustained. Another study on the comparison among asset pricing equations is conducted by (Hung, Siddique and Xu, 2004). They examine stock returns in the United Kingdom using

CAPM, the three-factor model, and CAPM with higher-order co-moments across assets and establish that the CAPMC is significant even when factors based on size and book-to-market are included.

Tepmony (2010) investigates the effect of including/excluding systematic skewness and systematic kurtosis in the classical CAPM and finds that When excluding the skewness effect and *kurtosis* effect in the model, the adjusted $R^2$ on the average, are about 31% and 32%, respectively; however when these two terms are included in the model, the adjusted $R^2$ increases significantly to 38.39%. This suggests that the skewness and the *kurtosis* are not highly collinear with each other and thus they play different roles in the four-moment CAPM fundamental relation. Iqbal and Brooks (2007) explore the alternative risk estimators and their applicability on the asset pricing tests based on the Fama-MacBeth procedure using data of eighty-nine continuously trading stocks in Karachi stock market for a period of six years ranging from 1999 to 2005. They find that certain risk factors including the systematic skewness explain individual stock returns with daily and weekly data. Also, this is corroborated in a broader sample of thirteen years period spanning through 1992 to 2006 in Iqbal and Brooks (2008). Javid (2009) employs unconditional and conditional information to estimate the higher moments CAPM in Pakistani equity market and reveals that the unconditional and conditional three-moment CAPMs perform relatively well in explaining risk-return relationship in Pakistan during the sample period; while the results of the higher-moment model indicate that systematic covariance and systematic cokurtosis have marginal role in explaining the asset price behavior in Pakistan. Tamara and Evgeniya (2011) use a sample of weekly returns of the most liquid Russian stocks over the financially stable period of 2004-2007 and over the crisis period of 2008-2009 to test the CAPM with higher moments. They confirm that the unconditional CAPMs prove to have low explanatory power for the financially stable period and the test results are found not to be statistically significant for the crisis period. However, Incorporating additional risk measures of the third and fourth moments and adopting one-sided risk measures only slightly increases the explanatory power. The highest explanatory power is offered by the unconditional CAPM of the (Harlow & Rao's 1989) downside systematic risk measure with zero benchmark.

## 3 Methodology

The study augments the pricing errors of Kraus and Litzenberger (1978) and Fang and Lai (1997) in several important ways and subjects them to a two-pass regression technique of (Fama & Macbeth, 1973). The refined expressions are presented as follows:

The Three Moments CAPM Pricing Equation by Kraus and Litzenberger (1978) in an unconditional form can be stated as:

$$\tilde{r}_i = \alpha_0 + \alpha_1 \hat{\beta}_i + \alpha_2 (\hat{sk})_i + \alpha_3 (\hat{k}t)_i + \mu_i \tag{1}$$

Where: $\tilde{r}_i$ is the average return on i`th securities

$\hat{\beta}_i$ is the estimated beta for i`th securities

$(\hat{sk})_i$ is the estimated skewness for i`th securities

$(\hat{k}t)_i$ is the estimated kurtosis for i`th securities

$\alpha_0 \ldots\ldots\ldots \alpha_3$ are the regression parameters

$\mu_i$ is the residual error term.

Chen (1980, p.8) noted that if the two factors of the APT were appropriate; then equation (1) can be obtained with at least two significant pricing factors.
The systematic risks can be derived from the time series regression below:

$$r_{it}\text{-}r_f = a_0 + \beta(r_{mt} - r_f) + sk\,(r_{mt} - r_f)^2 + \varepsilon_t \tag{2}$$

Where β and sk are the estimated risk proxies for $\beta^{\wedge}$ respectively in equation 1; while $r_f$ and $r_m$ are risk free rate and market return respectively.
Equation (2) is referred to as pricing kernels or quadratic market equation.
Fang and Lai (1997) develop an extension of the (Krans and Litzenberger)'s two-factor CAPM, popularly referred to as the four-moment CAPM pricing error relation. Their specification is stated in an unconditional format as:

$$r_{it} = \mu_0 + \lambda_1\beta_{it} + \lambda_2 k_{it} + \lambda_3 k_t + v_t \tag{3}$$

Where: $k_t$ is defined as systematic co-kurtosis other variables had been defined in equation (1)
Deriving a proxy for kt involves stating the cubic market equation as follows:

$$r_i\text{-}r_f = b_0 + \beta(r_{mt} - r_f) + sk\,(r_{mt} - r_f)^2 + k_t(r_{mt} - r_f)^{3\,+}\,w \tag{4}$$

Therefore, estimating the following equations gives loadings for β, sk and $k_t$ respectively.

$$r_{it}\text{-}r_f = a_0 + \beta(r_{mt} - r_f)^{\,+}\,z_t \tag{5}$$

$$r_{it}\text{-}r_f = b_0 + sk\,(r_{mt} - r_f)^{2\ +}\,\mu_t \tag{6}$$

$$r_{it}\text{-}r_f = c_0 + kt\,(r_{mt} - r_f)^{3\ +}\,e_t \tag{7}$$

The authors modify these models in line with Pentigill et al's (1995) method in order to investigate if there is any difference in moving from unconditional test to conditional test of these pricing equations by Kraus and Litzenberger (1976) and Fang and Lai (1997).
The Conditional Two-Factor CAPM Model is given as:

$$r_{it} = \mu_t + y_0{*}(D){*}\beta^{\wedge}{}_{it} + y_1{*}(1-D){*}\,\beta^{\wedge}{}_{it} + y_2{*}(D){*}sk^{\wedge}{}_{it} + y_3{*}\,(1\text{-}D){*}\,sk^{\wedge}{}_{it} + \quad w_t \tag{8}$$

Bring in systematic co kurtosis risk into equation 8 the Conditional Four Moment CAPM Model can be arrived at as:

$$r_{it} = c_0 + c_1{*}(D){*}\beta^{\wedge}{}_{it} + c_2{*}(1-D){*}\,\beta^{\wedge}{}_{it} + c_3{*}(D){*}sk^{\wedge}{}_{it} + c_4{*}\,(1\text{-}D){*}\,sk^{\wedge}{}_{it} + c_5{*}(D){*} + k^{\wedge}t_{it} + {*}(1\text{-}D){*}\,k^{\wedge}t_{it} + v_t \tag{9}$$

Where: D is a dummy variable ranging between 0 and 1, it is (1) if $r_m$ - $r_f$ > 0 and 0 if $r_m$ – $r_f$ < 0.
On the a-priori, these specifications are expected to improve the explanatory power of the CAPM by yielding larger value of adjusted R-squared. Also, the pricing factors are expected to be significantly different from zero except in case of the intercept risk premium factor.

### 3.1 Data Source

The data employed in this study are purely secondary data of raw stock prices and market indices which are respectively sourced from NSE web-site: www.cscsnigerialtd.com and NSE Daily Official List. The data cover a sampling period of Jan 2003 to December 2011. However, they are transformed to monthly stock returns using logarithmic equation.

## 4 Results

### 4.1 Derivation of Proxies for the Risk Factors in the CAPM four Moments Fundamental Relation.

The risk factors in the four moment CAPM pricing equation as specified in equation (4) are: Covariance, Co skewness and Co kurtosis risks. The proxies for these factors are derived from the estimated values/coefficients of equations 5, 6 and 7 respectively whose results are presented in the appendix. The table shows that all the stocks display negative skewness and positive kurtosis less than 3. The negative value of skewness is not significant for any stock since the market would display positive skewness. However, it is documented in the literature that emerging markets stocks are generally characterized with negative skewness while developed market stocks display positive skweness (Aggarwal, Incean & Leal 1999). Therefore our findings here are analogous to Aggarwal et, al 1999. The small values of kurtosis reveals that the stocks in Nigerian capital market have platy kurtic behavour which means returns of these stocks are not distributed to the extreme tail. Thus, all these stock deviate slightly from normality as they are characterized with asymmetry and tin tail. Also, the values of the Adjusted R-squared and F-statistics show that the time series equation 7 is well fitted and the explanatory power of the time series equation (5) has improved in most of the stocks when the fourth moment is added to it.

### 4.2 The Associations between Covariance, Co skewness and Co kurtosis Risks

The associations between the risk factors in the four-moment CAPM fundamental relation are presented in table 4.1

Table 4.1: Correlation between the systematic risk premia in equation 4

| | Return | Covariance | Co skewness | Co kurtosis |
|---|---|---|---|---|
| Return | 1 | | | |
| Covariance | 0.017 | 1 | | |
| Co skewness | -0.109 | -0.384 | 1 | |
| Co kurtosis | 0.042 | 0.745 | -0.099 | 1 |

Source: Authors' Computation

The results displayed in table 4.25 are prettily amazing since the risk factors demonstrate different trends of associations with each other and with mean return. The covariance and co kurtosis risk premia have positive correlation coefficients (0.017 and 0.042 respectively) with mean return. This is analogous with the heroic convection that risk increases with increase in return. It is also discovered that the covariance risk maintains positive association with co kurtosis risk but negative with co skewness risk, while co skewness and co kurtosis risk have inverse relation. It means investors co skewness risk reduces with increases in covariance and co kurtosis risks.

Table 4.2: The Results of the Unconditional Test of the Four Moments CAPM

| Factor risk premium | coefficient | std error | t-value | p-value |
|---|---|---|---|---|
| Constant | -0.005 | 0.008 | (-0.654) | 0.516 |
| Covariance | -0.027 | 0.035 | (-0.784) | 0.437 |
| Co skewness | -0.024 | 0.013 | (-1.851) | 0.070 |
| Co kurtosis | 0.021 | 0.029 | (0.737) | 0.465 |

Note: The standard errors and t-values are in italics and parenthesis respectively. The critical t-value with 50 Degree of freedom @ 95% confidence level using one tale test is 1.684 and $AR^2$ is -0.041.
Source: Authors' Computation

The results of the test of the four moments CAPM pricing implication in table 4.2 reveal observed t-values of the covariance, co skewness and co kurtosis risks (-0.784, -1.851 and 0.737 respectively). Given a critical t-value of 1.684, it means that the only risk that is significantly priced using the unconditional four moments CAPM is the systematic co skewness risk. Hence, the Nigerian capital market pays premium to investors for assuming such risk. The odd risk premium (0.021) for co kurtosis suggests that investors in the market prefer co kurtosis risk but they are not rewarded. However, the four moments pricing equation does not improve the explanatory power of the CAPM since it's Adjusted R-squared -0.041 still remains negative. Therefore, the unconditional test results are unsatisfactory according to a-priori.

## 4.4 Diagnostic Test on the CAPM with Higher Order Co moments

The test on whether the CAPM explanatory power could be improved by incorporating additional market factors has been proved imprecise or in consistent with expectations using unconditional approach. This is probably due to problems of mis-specification or presence of first order series correlation. To diagnose these problems, the model is subjected to three basic tests as revealed in table 4.3

Table 4.3: Diagnostic Test Results on the CAPM with Higher Order Co moment

| Test Statistics | LM Version | F Version |
|---|---|---|
| Serial correlation CHQ(1) | 0.00052(0.982) | F(1.48) 0.00047(0.983) |
| Functional form CHQ(1) | 0.1776(0.674) | F(1.48) 0.161(0.690) |
| Heteroscedasticity CHQ(9) | 1.4932(0.997) | F(9.43) 0.1385(0.998) |

Note: The values in italics and parenthesis are the test statistics and p-values respectively
Source: Author's Computation

The diagnostic test results on the four moments CAPM reveal that the observed probability values for the three tests are larger than the critical probability value of 0.05, which means that the null hypotheses that the model is mis-specified, its residuals are independent and homoscedastic, and therefore not rejected at 0.05 significantly level of alpha (α). Since this version of the CAPM with four moments has also failed in explaining significant variations in average return, it has poised us to subject the model to conditional test. Our results are very attractive either in the up-market or down-market phase.

### 4.5 Conditional Test of the Four Moments CAPM Fundamental Relation

Applying equation 9 for (D = 0) and (D = 1) gives the results of the conditional test on the four moments CAPM in each of the two market phases as shown in table 4.4

Table 4.4: The Results of the Test Conducted on the Four Moments CAPM Pricing Error in up and down market phases

| Down market phase<br>Pricing factor coefficient | Up-market phase<br>Pricing factor coefficient |
|---|---|
| Constant -0.007(0.007)[-1.000] | Constant 0.022(0.004)[6.084]** |
| Covariance -0.135(0.030)[-4.510]** | Covariance -0.023(0.007)[-0.319] |
| Co skewness -0.080(0.045)[-1.796]* | Co skewness -0.004(0.050)[-0.090] |
| Co kurtosis 0.009(0.025)[0.339] | Co kurtosis -0.083(0.072)[1.156] |

Note: The figures in parenthesis and brackets are the standard errors and t-values respectively. The critical t-values using t-test with 50 Degree of freedom @ 99% & 95% confidence levels are 2.423 and 1.684 respectively. $AR^2$ are 0.30 & 0.16 respectively for down and up market conditions.
Source: Authors' Computation

The results depicted in table 4.4 relate to the unconditional and conditional based tests. The systematic co kurtosis is not significantly priced in the two market phases. However, the difference is seen in the cases of covariance and co-skewness risk factors which are priced in the down-market but are not in the up-market. The $AR^2$ obtained from the four moments pricing equation (0.30 for down-market and 0.16 for up-market phases). Therefore, the inclusion of the fourth moment has yielded significant difference in the descriptive ability of the four-moment pricing error in both up-market and down-market conditions.

## 5 Conclusion and Recommendations

The study presents empirical proofs on the validity of the CAPM with higher order comoments (CAPMC) using unconditional and conditional information in Nigerian stock market. The results of the unconditional CAPMC reveal that the only relevant risk premium that plays significant role in explaining variation in asset returns is the systematic coskewness risk; while the covariance and cokurtosis risks appear to be insignificant in the market based on the unconditional test. This unconditionally significant relationship between average return and coskewness is also confirmed in the studies of Friend and Westerfied, (1980) and Javid and Ahmad, (2008). We discover in the conditional based test that all the risk factors except the risk-free premium are not priced in the up-market leading to the conclusion that the investors in Nigerian equity market are rewarded for taking specific market risk when the market is bullish. However, the covariance and cokurtosis risks are dominant risk premia playing significant impact on the determination of asset returns but cokurtosis risk still remains insignificant. These findings are partly inconsistent with the studies of Christie-David and Chaudhry (2001), Dittmar, (2002), and Sidique and Xu, (2004). Finally we find that the inclusion of the third moment and fourth moment into the CAPM traditional pricing relation augmented with conditional information has improved the descriptive power of the model justifying the claims of (Ferson & Harvey, 1999) Tepmony (2010) and (Tamara & Evgeniya, 2011). Therefore, based on our findings, we recommend that investors should increase their holding in the up-market so that to eliminate the cokurtosis risk. Since, the market does not pay premium when the market is bullish, it is recommended that investor should strive to hold optimum portfolios in this market phase. We also recommend that investors should intermittently adjust the size/proportion of the assets of their portfolios based on conditional information and preference to specific risk which he/she can hedge or mitigate through diversification.

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## Appendix

### Time Series or one Pass Regression Results on CAPMC

| S/N | COMPANY | r | B^ | AR2 | F-STAT | S^K | AR2 | F-Stat | K^t | AR2 | F-Stat |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | AG Leventis x1 | 0.000019 | 0.384 | 0.2 | 27.859 | -0.539 | 0.21 | 28.782 | 0.3 | 0.038 | 5.198 |
| 2 | Alico x2 | 0.0073 | 0.462 | 0.239 | 34.669 | -0.501 | 0.14 | 18.774 | 0.36 | 0.044 | 5.96 |
| 3 | Ashaka cement x3 | -0.008605 | 0.458 | 0.272 | 41.067 | -0.596 | 0.24 | 34.57 | 0.35 | 0.051 | 6.804 |
| 4 | Academy x4 | 0.001835 | 0.438 | 0.365 | 62.588 | -0.491 | 0.24 | 34.022 | 0.46 | 0.143 | 18.79 |
| 5 | Avoncrown x5 | 0.010058 | 0.482 | 0.297 | 46.119 | -0.467 | 0.14 | 18.73 | 0.46 | 0.091 | 11.71 |
| 6 | Beta Gas x6 | 0.003989 | 0.477 | 0.357 | 60.528 | -0.438 | 0.15 | 20.087 | 0.49 | 0.131 | 17.15 |
| 7 | Bocgas x7 | 0.001837 | 0.44 | 0.268 | 40.141 | -0.528 | 0.2 | 27.534 | 0.4 | 0.075 | 9.724 |
| 8 | Cadbury x8 | -0.001649 | 0.458 | 0.359 | 61.013 | -0.474 | 0.2 | 27.131 | 0.49 | 0.147 | 19.44 |
| 9 | Champion brew x9 | 0.1038 | 0.456 | 0.234 | 33.724 | -0.491 | 0.14 | 18.057 | 0.48 | 0.09 | 11.57 |
| 10 | CAP x10 | 0.0055 | 0.457 | 0.336 | 55.221 | -0.451 | 0.17 | 22.229 | 0.46 | 0.116 | 14.98 |
| 11 | CCNN X11 | 0.000033 | 0.476 | 0.246 | 35.816 | -0.568 | 0.18 | 24.357 | 0.4 | 0.056 | 7.326 |
| 12 | D N meyer x12 | 0.0058 | 0.44 | 0.247 | 36.15 | -0.469 | 0.14 | 18.759 | 0.49 | 0.108 | 13.66 |
| 13 | Dunlop x13 | 0.0085 | 0.51 | 0.25 | 36.706 | -0.467 | 0.1 | 13.381 | 0.51 | 0.084 | 10.86 |
| 14 | Ekocorp x14 | 0.00391 | 0.49 | 0.343 | 56.884 | -0.443 | 0.1 | 18.507 | 0.49 | 0.12 | 15.66 |
| 15 | First bank x15 | -0.00688 | 0.458 | 0.338 | 55.635 | -0.537 | 0.24 | 34.674 | 0.36 | 0.07 | 9.062 |
| 16 | First bank x16 | -0.0058 | 0.517 | 0.381 | 66.978 | -0.406 | 0.12 | 15.044 | 0.59 | 0.176 | 23.81 |
| 17 | Flour mills x17 | 0.00605 | 0.491 | 0.303 | 47.548 | -0.505 | 0.16 | 21.776 | 0.46 | 0.09 | 11.62 |
| 18 | Glaxosmith x18 | 0.00588 | 0.47 | 0.417 | 77.437 | -0.532 | 0.28 | 41.552 | 0.47 | 0.145 | 19.1 |
| 19 | Guaranty x19 | 0.00336 | 0.481 | 0.377 | 65.736 | -0.55 | 0.25 | 37.338 | 0.42 | 0.097 | 12.58 |
| 20 | Guiness x20 | 0.00246 | 0.502 | 0.457 | 91.094 | -0.47 | 0.2 | 28.346 | 0.52 | 0.173 | 23.45 |
| 21 | John Holt x21 | 0.006011 | 0.502 | 0.322 | 51.854 | -0.481 | 0.15 | 19.763 | 0.48 | 0.102 | 13.02 |
| 22 | Jullius begger x22 | 0.001706 | 0.426 | 0.272 | 41.018 | -0.524 | 0.21 | 29.84 | 0.32 | 0.049 | 6.502 |
| 23 | Mobil x23 | 0.015528 | 0.406 | 0.146 | 19.234 | -0.43 | 0.08 | 10.455 | 0.48 | 0.071 | 9.165 |
| 24 | Mrs x24 | 0.002222 | 0.455 | 0.442 | 85.798 | -0.481 | 0.25 | 37.275 | 0.49 | 0.185 | 25.26 |
| 25 | May &baker x25 | -0.000437 | 0.526 | 0.376 | 65.468 | -0.438 | 0.13 | 16.975 | 0.47 | 0.101 | 13.02 |
| 26 | Nigeria ropes x26 | 0.028367 | 0.576 | 0.091 | 11.76 | -0.528 | 0.04 | 4.839 | 0.48 | 0.016 | 2.742 |
| 27 | Nigerins x27 | -0.00324 | 0.513 | 0.372 | 64.496 | -0.5 | 0.18 | 24.365 | 0.54 | 0.147 | 19.41 |
| 28 | Niwicable x28 | -0.00179 | 0.476 | 0.226 | 32.272 | -0.58 | 0.17 | 23.221 | 0.43 | 0.061 | 7.942 |
| 29 | NNFN x29 | 0.00603 | 0.479 | 0.336 | 55.204 | -0.459 | 0.16 | 20.745 | 0.5 | 0.127 | 16.5 |
| 30 | Okomu x30 | 0.00909 | 0.4 | 0.337 | 55.506 | -0.397 | 0.17 | 22.616 | 0.4 | 0.117 | 15.24 |
| 31 | Oando oil x31 | -0.00299 | 0.103 | 0.008 | 1.85 | -0.005 | -0 | 0.002 | 0.01 | -0.009 | 0.007 |
| 32 | Pz x32 | 0.00806 | 0.491 | 0.417 | 77.616 | -0.467 | 0.19 | 26.325 | 0.51 | 0.159 | 21.29 |
| 33 | Presco x33 | 0.00302 | 0.546 | 0.373 | 64.552 | -0.475 | 0.14 | 18.49 | 0.57 | 0.142 | 18.78 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **34** | **Prestige x34** | **-0.00326** | **0.514** | **0.436** | **83.847** | **-0.365** | **0.11** | **13.902** | **0.56** | **0.184** | **25.14** |
| **35** | **RT Briscoe x35** | **0.00378** | **0.463** | **0.365** | **62.481** | **-0.48** | **0.2** | **27.829** | **0.49** | **0.143** | **18.83** |
| **36** | **Royalex x36** | **-0.002876** | **0.448** | **0.266** | **36.699** | **-0.468** | **0.15** | **19.373** | **0.45** | **0.012** | **11.81** |
| **37** | **Total x37** | **-0.004489** | **0.486** | **0.45** | **88.69** | **-0.454** | **0.2** | **27.748** | **0.53** | **0.188** | **25.8** |
| **38** | **Trippleg x38** | **0.009179** | **0.481** | **0.205** | **28.53** | **-0.538** | **0.13** | **16.985** | **0.45** | **0.058** | **7.644** |
| **39** | **UBA X39** | **-0.001076** | **0.541** | **0.255** | **37.562** | **-0.435** | **0.08** | **9.859** | **0.55** | **0.086** | **11.1** |
| **40** | **Unilever plc x40** | **0.00529** | **0.5** | **0.393** | **70.224** | **-0.52** | **0.22** | **30.551** | **0.43** | **0.101** | **13.06** |
| **41** | **Union bank x41** | **-0.013437** | **0.547** | **0.308** | **48.51** | **-0.601** | **0.19** | **26.05** | **0.42** | **0.06** | **7.836** |
| **42** | **UAC X42** | **-0.000395** | **0.49** | **0.429** | **81.554** | **-0.455** | **0.19** | **25.644** | **0.58** | **0.212** | **29.85** |
| **43** | **UACN X43** | **0.000745** | **0.457** | **0.446** | **87.135** | **-0.454** | **0.22** | **21.139** | **0.47** | **0.165** | **22.16** |
| **44** | **UNIC X44** | **-0.001077** | **0.486** | **0.298** | **46.456** | **-0.458** | **0.13** | **17.378** | **0.41** | **0.069** | **8.872** |
| **45** | **UTC X45** | **0.006256** | **0.509** | **0.259** | **38.365** | **-0.613** | **0.19** | **26.537** | **0.45** | **0.066** | **8.581** |
| **46** | **UPL X46** | **0.004598** | **0.489** | **0.291** | **46.761** | **-0.464** | **0.14** | **17.708** | **0.47** | **0.093** | **11.93** |
| **47** | **UNTL X47** | **-0.0042** | **0.434** | **0.224** | **31.923** | **-0.441** | **0.12** | **15.024** | **0.43** | **0.073** | **9.393** |
| **48** | **Vital foam x48** | **-0.00332** | **0.442** | **0.309** | **48.85** | **-0.519** | **0.22** | **31.038** | **0.39** | **0.082** | **10.52** |
| **49** | **Vono x49** | **0.00124** | **0.17** | **0.241** | **36.646** | **-0.46** | **0.16** | **20.578** | **0.39** | **0.071** | **9.238** |
| **50** | **Wapco x50** | **0.00268** | **0.522** | **0.425** | **80.055** | **-0.512** | **0.21** | **29.046** | **0.48** | **0.124** | **16.1** |
| **51** | **Wapic x51** | **0.00389** | **0.52** | **0.366** | **62.824** | **-0.498** | **0.17** | **22.847** | **0.54** | **0.139** | **18.21** |
| **52** | **Wema Bank x52** | **-0.0216** | **0.562** | **0.206** | **28.692** | **-0.168** | **0** | **1.059** | **0.68** | **0.105** | **13.59** |