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EMPIRICAL TEST OF CAPITAL ASSET PRICING MODEL ON SECURITIES RETURN OF LISTED FIRMS IN NIGERIA

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Abstract: This paper applied the capital-asset pricing model (CAPM) to determine stock returns of listed firms in the Nigeria Stock Exchange (NSE). For the purpose of investigation, annual data on stock price of twenty six (26) listed firms, Treasury bill a measure of risk- free rate and all share indexes a proxy for market returns were extracted while beta value was computed for the period 2010 to 2016 upon which the model was analyzed. Finding indicates that the CAPM generated a very high return among the firms given the influence of the beta coefficient. The study concludes that higher market risk measured by beta, is associated with higher expected returns. It is therefore recommended that managers of firms in other sectors in Nigeria need to constantly use this model to price security return with a view to guiding investors at investing in securities based on risk preference behavior and also to enable them maximize wealth from a basket of portfolio. .

Key words: Market returns; Treasury bill; beta; covariance; security return; Stock Returns

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JEL Classifications: G12, E4

1. Introduction

The capital asset pricing model (CAPM) of Sharpe (1964) grew from the mean- variance analysis of Harry Markowitz in 1952 and 1959 to assess securities risk and returns in the stock market. The mean- variance is used to assess the risk peculiar to individual securities against the expected returns. The mean- variance approach

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holds the view that expected return (gain) from securities is a reflection of the level of associated risk. Following this, the CAPM demonstrates the linear association between market risk and return of portfolios given risk-free rate (Lipiec, 2014). The risk free asset often measured with Treasury bills and government bond is used to minimize risk and maximize returns in the capital asset pricing model. Example of risk- free asset is Treasury bills. Treasury bills as money market instrument attract very minimal risk with a low return on it, unlike investment in risky assets such as shares in the stock market.

The CAPM shows the market risk associated with portfolio return for a time window (Oke, 2013). The risk common to the market portfolio is revealed through a beta co-efficient. Herbert, Nwude and Onyilo (2017), posit that the CAPM and its beta component are presumed to be good predictors of asset returns in finance literature. Usually the risk in the market portfolio determines its returns. What happens to the market affect every security in the market. The impact of beta in the stock market affecting security returns may be described in the U.S aphorism: 'when they raid the brothel, they took all the girls away', portraying that systematic factors occurring in the market, affect the securities return. Generally, the securities market as a whole has a beta coefficient of 1.0. The beta co-efficient of individual firms are calculated relative to the market beta. Beta can be calculated through dividing the co-variance between individual securities and market to the variance of market. A beta above 1.0 implies a higher risk and a beta below 1.0 implies less than the market average risk. Beta could be positive or negative. High and positive beta (β) increase the risk of the investor's portfolio such that investors tend to demand higher expected return in compensation for the high risk. If the stock has negative a beta(β), it reduces the risk of the market portfolio and this ordinarily makes an investor to accept a lower expected return in exchange for the risk reduction. In this case, investors in the stock market are able to build a basket of portfolio around their risk preference behavior which consists of risk aversion, risk seeking and risk neutral.

Prediction of securities return in the light of market risks through CAPM holds under assumptions. These assumptions are segmented into classical and non- classical assumptions. The classical assumptions are often relaxed to give room for the non- classical assumptions. Some of the classical assumptions according to Olowe (1997) are that investors are risk averse, investors are price takers and have homogenous expectations about securities (or assets), there exists a risk free security (or asset) such that investors may borrow or lend unlimited amount at the risk-free, securities (or assets) are marketable and perfectly divisible, securities markets are frictionless. Information is costless and simultaneously available to all investors and there are no market imperfections such as taxes, regulations, or transaction costs. These classical assumptions partly do not hold in real life market situation. Hence they are relaxed to form the non- classical assumptions upon which investors are guided in taking investment decision on portfolio investments. Arguing in support of the non- classical assumption, Fama and French (2004) believe that the assumption that short selling is unrestricted is as unrealistic as unrestricted risk-free borrowing and lending. If there is no risk-free asset and short-sales of risky assets are not allowed, mean-variance investors will still choose efficient portfolios (Oke, 2013). But basically all attractive models involve impractical simplifications, which is why they must be tested against data. Against this backdrop, this study is undertaken with a view to contributing to accounting and finance literature using data from listed firms in the Nigeria Stock Market. Following the introductory part, section two is literature review, section three is methodology and section four is empirical analysis while section five dwells on conclusion and recommendations.

2. Litertature Review

2.1 Theoretical framework

The portfolio theory developed by Markowitz (1952), has to do with a concept of using the variance of expected returns as a measure of risk an investor can form an efficient portfolio that minimizes the risk for a given level of return and maximizes the return for a given level of risk, had a greater influence over the development of CAPM by Sharpe (1964) and Linter (1965). The CAPM is an extension of portfolio theory, which implies that beta alone

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is sufficient to explain the cross section return of any security at any given point of time. Thereafter, numerous researches on the CAPM have been made to test the validity of this model but empirical test results generated many unsolved questions regarding the applicability of this model in different markets throughout the world. The CAPM is built on the modern portfolio theory which was initially developed by Markowitz (1952). As developed by Sharpe (1964) and Lintner (1965), the CAPM models the equilibrium expected return on an asset as a positive linear function of its beta risk. In the CAPM world, the only relevant risk measure is systematic risk, as this cannot be diversified away. Investors should be proportionately rewarded for bearing this risk. Beta measures the volatility (risk) of a share or a share portfolio and hence estimates how the returns on the share or portfolio will move relative to the movements in the market portfolio (Jones, 1998). By definition, the market portfolio has a beta of one. The beta of a portfolio is the weighted average of the betas of all securities contained in the portfolio. Therefore, portfolios with betas greater than one have higher systematic risk than the market, while those with betas less than one have lower systematic risk. Hence, by adding securities with betas that are higher to a portfolio, we increase the systematic risk of the portfolio and hence shares, or share portfolios with high betas should exhibit high returns and *viz*. (Elton & Gruber, 1995).

2.2 Empirical Review

Khan. et al. (2012) assessed and tested the CAPM through the calculation of beta of ten companies registered on the Karach Stock Exchange and the comparison between actual and expected returns. It was found that the Capital Asset Pricing Model (CAPM), failed to give accurate results. Mobarek & Mollah (2005) investigated the underlying factors determining share returns on the Dhaka Stock Exchange (DSE) and found unsupportive results of the critical condition of the CAPM that stock beta is positively related to share return. Rahman & Baten (2006) examined the validity of the CAPM in Bangladesh using 120 non-financial firms listed in Dhaka Stock Exchange for the period of 1999 to 2003. They found that the variables like beta, book to market value and size have strong relationships with stock return. Michailidis et al. (2006) tested weekly stock returns of 100 firms listed in Greece between January 1998, and December 2002, and arrived at conclusions that higher risk is correlated with higher return, but the reverse correlation does not hold. Adedokun & Olakojo (2012) arrived at the same results by testing monthly stock returns from a hundred Nigerian firms between January 2008, and December, 2009. Hasan et al. (2013) tested CAPM for the Bangladesh stock market and found out that this model does not prove its validity. Rahman (2012) in his study found a significant negative relationship between taking risks and extra return using weekly data of 87 publicly listed companies in DSE from 2000 to 2008. Lipiec (2014) studied test the capital asset pricing model (CAPM) on the Warsaw Stock Exchange (WSE) by measuring the performance of two portfolios composed of construction firms: family-controlled and nonfamily controlled. These portfolios were selected from the Warszawski Indeks Giełdowy listed in the Warsaw Stock Exchange Index) in the period 2006 to 2012 with respect to three sub-periods, namely, pre-crisis period of 2006 to2007; crisis period of 2008 to 2009 and post-crisis period of 2010 to 2012. The finding indicates that public family firms significantly outperformed non-family peers in the crisis times in terms of security returns.

Herbert et al. (2017) applied the capital asset pricing model to determine stock returns of listed firms in the chemicals and paints sector of Nigeria over a 13-year period, 2000 to2012. From the empirical result, the beta content of the entire sector ranges between 1.04% and -0.13 or between 6.78 and -2.31% providing an average beta content of 0.37 or 1.50% of the total risk for the sector. The results further indicate that the unsystematic risk content in chemicals/paints sector stocks constitutes the bulk of the sector's risk profile and that most of the stocks' betas had defensive attributes over the study period. The investment implication is that including an appropriate mix of chemical and paints stocks in the investors' portfolios would, all things being equal, help investors to achieve a combination of investments that are not highly correlated with larger economic cycle as well as higher-risk equity securities that can potentially yield higher returns than the market.

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3. Methodology

The main objective of this research is to examine the validity of Capital Assets Pricing Model in pricing portfolio return of listed firms in Nigeria. To attain this objective, data on stock price of twenty six (26) listed firms were collected from the Nigeria Stock Exchange publications while Treasury bill rates and All Share Index data used as proxies for Risk-free rates and market Returns were sourced from the Central Bank of Nigeria Statistical Bulletin respectively. After calculating the beta for the security, expected return or required rate of return for the security was determine using the panel CAPM estimation method. The approach used is a follow up of the research procedure of Oke (2013).

3.1 Model Specification

Capital Asset Pricing Model (CAPM)

The CAPM is usually expressed as:

$$E(R_{1-RF}) = Rf + \beta_1(E)Rm - (Rf)$$

Where:

$E(R_1 - RF)$ is the expected excess return on the capital asset. Rf is the risk-free rate of interest. β_1 is the beta coefficient (The sensitivity of the asset returns to market returns). $E(R_m)$ is the expected return of the market. $E(R_m)$ Rf is the risk premium (the difference between the expected market rate of return and the risk-free rate of return).

4. Empirical Analysis

The tables below represents the descriptive and correlation statistics analysis as well as the capital asset pricing model panel estimation results of the sampled manufacturing firms in Nigeria for the period 2010 to 2016. (As well see Appendix A and Appendix B).

Table 1: Descriptive statistics

stats	stock_~s	market~s	free_r~e	beta
mean	.7270879	3.837143	10.54429	.2078022
p50	0	4.59	10.97	.05
max	57.2	6.19	14.27	7.49
min	-50.16	.02	4.57	-13.81
sd	10.39977	2.478659	3.225802	1.904334
skewness	.4807739	-.6028233	-.6384747	-1.586072
kurtosis	10.85942	1.692664	2.26016	20.39744
N	182	182	182	182

Table 2: Correlation Matrix

	stock_~s	market~s	free_r~e	beta
stock_retu~s	1.0000			
market_ret~s	0.1031	1.0000		
free_risk_~e	-0.0989	0.3054	1.0000	
beta	0.1166	-0.0297	-0.1129	1.0000

Table 3: Hausman test

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	re	fe	Difference	S.E.
Market_Pre~m	1.194699	1.194699	-3.11e-15	1.69e-08

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Table 4: Capm Fixed Effect Result

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Fixed-effects (within) regression          Number of obs      =       182
Group variable: cross                      Number of groups   =        26

R-sq:  within  = 0.1525                    Obs per group: min =         7
       between =      .                                   avg =       7.0
       overall = 0.1330                                   max =         7

                                           F(1,155)           =     27.89
corr(u_i, Xb)  = 0.0000                    Prob > F           =    0.0000

------------------------------------------------------------------------------
Firm_Excess_~t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+--------------------------------------------------------------
Market_Premium |   1.194699   .2262196     5.28   0.000     .7478279     1.64157
         _cons |   -1.80418   1.701736    -1.06   0.291    -5.165767    1.557407
---------------+--------------------------------------------------------------
                                 sigma_u |   4.068595
                                 sigma_e |  10.395272
                                     rho |   .1328367   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(25, 155) =     1.07                 Prob > F = 0.3807
```

Table 1 concerns the descriptive statistics result and it shows that the average stock returns of the sample firms is 72%, the maximum stock return is 572% while the average market return. The average beta is 20 and this may have compensated the investors by way of the mean portfolio return of 72%. The maximum beta value is 7.49. The risk free rate average value is 10.54% while the maximum return is 14.27%.

Table 2 relates to correlation matrix result. It shows there is a positive relationship between stock prices and market returns (R = 0.103). The relationship between bet (β) and stock price of the sampled manufacturing is positive (r = 0.1166) while market returns and risk free rates are positively correlated (r = 0.3054). The findings are consistent with Oke (2013); Lipiec (2014); Herber, Nwude & Onyilo (2017)

Table 3 deals with the Hausman test result. The table shows that fixed effect result is preferred for the analysis.

Table 4 relates to the capital asset pricing model panel estimation. It that shows that the overall R-squared result is 0.1330, which is 13%. The F – statistic of 27.89 is statistically significant given the probability value 0.0000. The firm excess return (market premium) for the period was positive (1.1946) and significant at 95% and it means that the market risks contribute largely to the expected returns of the firms in the period observed. The empirical findings are consistent with Mobarek & Mollah (2005).

Conclusions and Recommendations

This study applied the capital asset pricing model to determine portfolio returns of listed firms in the Nigeria Stock Exchange. Three components of the model, namely, risk free rate, market return and beta were determine with the data from secondary sources. The empirical results of the study explicitly suggests that share price return of the sampled firms improved very well after the stock market melt- down in Nigeria. This intriguing results may have be an influencing factor to investors in optimal portfolio selection, diversification as well as guiding their risk preference behavior in the stock market after the global financial crisis. The model is thus validated in Nigeria and therefore remains a potent tool for investors to assess returns on investment in stocks, other than relying on the Markowitz mean-variance to determine efficient securities. It is therefore suggested that future researchers need to apply the model to determine portfolio return of firms on sector by sector basis in pre-and-post stock market melt -down in Nigeria as this reveal the magnitude of the loss encountered by investors during these periods.

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APPENDIX A

CAPM PANEL DATA FOR MANUFACTURING COMPANIES

Fiscalyear	Full Company name	Cross	Listing Status	Machameratio Industry	Stock Price	Stock_ Returns	Market_ Returns	Free_Risk _Rate	Beta
2016	Academy	1.00	Ngse	Print	0.50	0.00	6.11	13.96	0.29
2015	Academy	1.00	Ngse	Print	0.55	-3.51	4.59	4.57	-0.75
2014	Academy	1.00	Ngse	Print	1.18	24.21	0.33	10.80	0.86
2013	Academy	1.00	Ngse	Print	2.55	0.00	6.19	10.97	1.04
2012	Academy	1.00	Ngse	Print	1.62	-9.50	5.98	11.77	-0.02
2011	Academy	1.00	Ngse	Print	2.20	-1.79	3.64	14.27	0.26
2010	Academy	1.00	Ngse	Print	3.68	-4.91	0.02	7.47	1.57
2016	Aluminium Extrusion Indus	2.00	Ngse	Metal	9.27	0.00	6.11	13.96	0.01
2015	Aluminium Extrusion Indus	2.00	Ngse	Metal	9.35	-4.98	4.59	4.57	0.08
2014	Aluminium Extrusion Indus	2.00	Ngse	Metal	10.43	0.00	0.33	10.80	0.02
2013	Aluminium Extrusion Indus	2.00	Ngse	Metal	10.50	0.00	6.19	10.97	0.00
2012	Aluminium Extrusion Indus	2.00	Ngse	Metal	10.55	0.00	5.98	11.77	0.12
2011	Aluminium Extrusion Indus	2.00	Ngse	Metal	11.15	0.00	3.64	14.27	0.02
2010	Aluminium Extrusion Indus	2.00	Ngse	Metal	12.39	0.00	0.02	7.47	0.16
2016	Ashaka Cement	3.00	Ngse	Cement	12.02	9.27	6.11	13.96	-0.55
2015	Ashaka Cement	3.00	Ngse	Cement	25.00	8.65	4.59	4.57	-0.77
2014	Ashaka Cement	3.00	Ngse	Cement	21.90	-3.52	0.33	10.80	3.09
2013	Ashaka Cement	3.00	Ngse	Cement	20.99	4.43	6.19	10.97	4.30
2012	Ashaka Cement	3.00	Ngse	Cement	17.95	-6.90	5.98	11.77	2.46
2011	Ashaka Cement	3.00	Ngse	Cement	11.30	-16.30	3.64	14.27	3.59
2010	Ashaka Cement	3.00	Ngse	Cement	26.51	6.04	0.02	7.47	2.85
2016	Avon Crowncaps & Containers	4.00	Ngse	Pack	1.14	-13.64	6.11	13.96	0.09
2015	Avon Crowncaps & Containers	4.00	Ngse	Pack	1.45	0.00	4.59	4.57	-0.16
2014	Avon Crowncaps & Containers	4.00	Ngse	Pack	1.59	0.00	0.33	10.80	0.71
2013	Avon Crowncaps & Containers	4.00	Ngse	Pack	1.71	0.00	6.19	10.97	0.18

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2012	Avon Crowncaps & Containers	4.00	Ngse	Pack	1.90	-4.52	5.98	11.77	-0.29
2011	Avon Crowncaps & Containers	4.00	Ngse	Pack	5.94	0.00	3.64	14.27	-0.07
2010	Avon Crowncaps & Containers	4.00	Ngse	Pack	6.91	0.00	0.02	7.47	0.01
2016	B.O.C Gases Nig	5.00	Ngse	Chem	3.53	0.28	6.11	13.96	-0.07
2015	B.O.C Gases Nig	5.00	Ngse	Chem	3.79	-4.77	4.59	4.57	0.03
2014	B.O.C Gases Nig	5.00	Ngse	Chem	5.48	0.00	0.33	10.80	-0.23
2013	B.O.C Gases Nig	5.00	Ngse	Chem	6.66	0.00	6.19	10.97	-0.07
2012	B.O.C Gases Nig	5.00	Ngse	Chem	6.25	4.69	5.98	11.77	0.02
2011	B.O.C Gases Nig	5.00	Ngse	Chem	6.85	0.74	3.64	14.27	0.08
2010	B.O.C Gases Nig	5.00	Ngse	Chem	9.20	-9.63	0.02	7.47	-0.27
2016	Berger Paints Nig	6.00	Ngse	Paint	6.40	2.73	6.11	13.96	-0.27
2015	Berger Paints Nig	6.00	Ngse	Paint	10.00	2.56	4.59	4.57	0.40
2014	Berger Paints Nig	6.00	Ngse	Paint	9.00	3.45	0.33	10.80	0.37
2013	Berger Paints Nig	6.00	Ngse	Paint	8.00	0.00	6.19	10.97	0.73
2012	Berger Paints Nig	6.00	Ngse	Paint	8.98	6.78	5.98	11.77	-0.04
2011	Berger Paints Nig	6.00	Ngse	Paint	8.47	-0.59	3.64	14.27	6.52
2010	Berger Paints Nig	6.00	Ngse	Paint	8.36	-7.11	0.02	7.47	2.11
2016	Beta Glass Company	7.00	Ngse	Pack	30.32	-8.32	6.11	13.96	-4.06
2015	Beta Glass Company	7.00	Ngse	Pack	53.45	4.95	4.59	4.57	-2.11
2014	Beta Glass Company	7.00	Ngse	Pack	27.78	25.99	0.33	10.80	-1.23
2013	Beta Glass Company	7.00	Ngse	Pack	14.43	4.95	6.19	10.97	-0.40
2012	Beta Glass Company	7.00	Ngse	Pack	10.50	0.00	5.98	11.77	-0.39
2011	Beta Glass Company	7.00	Ngse	Pack	12.71	0.00	3.64	14.27	0.51
2010	Beta Glass Company	7.00	Ngse	Pack	15.58	0.00	0.02	7.47	0.07
2016	Cement Comy Of Northern Nig	8.00	Ngse	Cement	5.00	11.61	6.11	13.96	-0.40
2015	Cement Comy Of Northern Nig	8.00	Ngse	Cement	9.35	26.18	4.59	4.57	0.79
2014	Cement Comy Of Northern Nig	8.00	Ngse	Cement	10.39	-7.97	0.33	10.80	1.64
2013	Cement Comy Of Northern Nig	8.00	Ngse	Cement	11.75	26.34	6.19	10.97	5.00
2012	Cement Comy Of Northern Nig	8.00	Ngse	Cement	5.30	7.72	5.98	11.77	0.20
2011	Cement Comy Of Northern Nig	8.00	Ngse	Cement	4.35	-9.38	3.64	14.27	0.49
2010	Cement Comy Of Northern Nig	8.00	Ngse	Cement	15.49	15.34	0.02	7.47	5.13
2016	Chemical & Allied Product	9.00	Ngse	Paint	32.00	-3.03	6.11	13.96	-0.38
2015	Chemical & Allied Product	9.00	Ngse	Paint	37.60	-0.92	4.59	4.57	-0.16
2014	Chemical & Allied Product	9.00	Ngse	Paint	37.50	3.65	0.33	10.80	-0.07
2013	Chemical & Allied Product	9.00	Ngse	Paint	48.45	-3.10	6.19	10.97	2.53
2012	Chemical & Allied Product	9.00	Ngse	Paint	28.00	3.93	5.98	11.77	0.90
2011	Chemical & Allied Product	9.00	Ngse	Paint	14.50	-9.99	3.64	14.27	1.05
2010	Chemical & Allied Product	9.00	Ngse	Paint	34.03	4.74	0.02	7.47	-0.11
2016	Cutix	10.00	Ngse	Elec	1.80	-4.76	6.11	13.96	0.60
2015	Cutix	10.00	Ngse	Elec	1.66	1.22	4.59	4.57	0.09
2014	Cutix	10.00	Ngse	Elec	1.30	-13.33	0.33	10.80	0.39
2013	Cutix	10.00	Ngse	Elec	1.78	0.00	6.19	10.97	1.99
2012	Cutix	10.00	Ngse	Elec	1.53	0.66	5.98	11.77	2.91
2011	Cutix	10.00	Ngse	Elec	1.55	-8.82	3.64	14.27	0.22
2010	Cutix	10.00	Ngse	Elec	2.21	0.00	0.02	7.47	1.37
2016	Dangote Cement	11.00	Ngse	Cement	173.99	12.98	6.11	13.96	1.19
2015	Dangote Cement	11.00	Ngse	Cement	170.00	8.27	4.59	4.57	1.02
2014	Dangote Cement	11.00	Ngse	Cement	200.00	11.17	0.33	10.80	0.75
2013	Dangote Cement	11.00	Ngse	Cement	218.99	12.30	6.19	10.97	1.52
2012	Dangote Cement	11.00	Ngse	Cement	128.10	5.43	5.98	11.77	1.07
2011	Dangote Cement	11.00	Ngse	Cement	110.77	5.39	3.64	14.27	1.11
2010	Dangote Cement	11.00	Ngse	Cement	120.00	-3.23	0.02	7.47	4.34
2016	Dn Meyer	12.00	Ngse	Paint	0.87	0.00	6.11	13.96	0.34
2015	Dn Meyer	12.00	Ngse	Paint	0.67	0.00	4.59	4.57	-0.04
2014	Dn Meyer	12.00	Ngse	Paint	0.87	0.00	0.33	10.80	-0.81
2013	Dn Meyer	12.00	Ngse	Paint	1.41	-4.08	6.19	10.97	1.08
2012	Dn Meyer	12.00	Ngse	Paint	1.55	-50.16	5.98	11.77	-1.66
2011	Dn Meyer	12.00	Ngse	Paint	1.07	4.90	3.64	14.27	0.05
2010	Dn Meyer	12.00	Ngse	Paint	3.51	-18.18	0.02	7.47	0.15
2016	Fidson Healthcare	13.00	Ngse	Pharmacetical	1.28	-12.33	6.11	13.96	-0.57
2015	Fidson Healthcare	13.00	Ngse	Pharmacetical	2.50	-12.28	4.59	4.57	-0.16
2014	Fidson Healthcare	13.00	Ngse	Pharmacetical	3.90	14.71	0.33	10.80	-3.16
2013	Fidson Healthcare	13.00	Ngse	Pharmacetical	2.79	32.86	6.19	10.97	0.66
2012	Fidson Healthcare	13.00	Ngse	Pharmacetical	1.06	3.92	5.98	11.77	-0.91

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2011	Fidson Healthcare	13.00	Ngse	Pharmacetical	0.79	-30.70	3.64	14.27	-0.72
2010	Fidson Healthcare	13.00	Ngse	Pharmacetical	3.06	5.52	0.02	7.47	1.20
2016	First Alumminium Nig	14.00	Ngse	Metal	0.50	0.00	6.11	13.96	0.00
2015	First Alumminium Nig	14.00	Ngse	Metal	0.50	0.00	4.59	4.57	0.00
2014	First Alumminium Nig	14.00	Ngse	Metal	0.50	0.00	0.33	10.80	0.00
2013	First Alumminium Nig	14.00	Ngse	Metal	0.50	0.00	6.19	10.97	0.00
2012	First Alumminium Nig	14.00	Ngse	Metal	0.50	0.00	5.98	11.77	0.00
2011	First Alumminium Nig	14.00	Ngse	Metal	0.50	0.00	3.64	14.27	0.00
2010	First Alumminium Nig	14.00	Ngse	Metal	0.73	-3.95	0.02	7.47	-2.76
2016	Flour Mills Of Nigeria	15.00	Ngse	Food	18.49	-5.13	6.11	13.96	-0.25
2015	Flour Mills Of Nigeria	15.00	Ngse	Food	20.80	4.00	4.59	4.57	0.33
2014	Flour Mills Of Nigeria	15.00	Ngse	Food	39.20	-22.08	0.33	10.80	-0.70
2013	Flour Mills Of Nigeria	15.00	Ngse	Food	87.00	-2.47	6.19	10.97	0.30
2012	Flour Mills Of Nigeria	15.00	Ngse	Food	65.00	-1.52	5.98	11.77	-0.08
2011	Flour Mills Of Nigeria	15.00	Ngse	Food	65.45	2.27	3.64	14.27	-2.78
2010	Flour Mills Of Nigeria	15.00	Ngse	Food	69.00	0.00	0.02	7.47	7.49
2016	Forte Oil (Ap)	16.00	Ngse	Oil	84.43	57.20	6.11	13.96	0.80
2015	Forte Oil (Ap)	16.00	Ngse	Oil	330.00	26.08	4.59	4.57	-2.86
2014	Forte Oil (Ap)	16.00	Ngse	Oil	227.90	2.66	0.33	10.80	-13.81
2013	Forte Oil (Ap)	16.00	Ngse	Oil	108.30	-5.00	6.19	10.97	-4.71
2012	Forte Oil (Ap)	16.00	Ngse	Oil	7.73	-12.56	5.98	11.77	0.98
2011	Forte Oil (Ap)	16.00	Ngse	Oil	11.60	-23.18	3.64	14.27	-2.96
2010	Forte Oil (Ap)	16.00	Ngse	Oil	21.90	2.91	0.02	7.47	1.14
2016	Ftn Cocoa Processors	17.00	Ngse	Plant	0.50	0.00	6.11	13.96	0.00
2015	Ftn Cocoa Processors	17.00	Ngse	Plant	0.50	0.00	4.59	4.57	0.00
2014	Ftn Cocoa Processors	17.00	Ngse	Plant	0.50	0.00	0.33	10.80	0.00
2013	Ftn Cocoa Processors	17.00	Ngse	Plant	0.50	0.00	6.19	10.97	-0.05
2012	Ftn Cocoa Processors	17.00	Ngse	Plant	0.50	0.00	5.98	11.77	0.00
2011	Ftn Cocoa Processors	17.00	Ngse	Plant	0.50	0.00	3.64	14.27	0.27
2010	Ftn Cocoa Processors	17.00	Ngse	Plant	0.61	-3.17	0.02	7.47	0.79
2016	Glaxosmithkline Nig	18.00	Ngse	Pharmacetical	15.75	12.50	6.11	13.96	0.24
2015	Glaxosmithkline Nig	18.00	Ngse	Pharmacetical	34.20	-10.00	4.59	4.57	1.00
2014	Glaxosmithkline Nig	18.00	Ngse	Pharmacetical	50.00	-3.85	0.33	10.80	-1.11
2013	Glaxosmithkline Nig	18.00	Ngse	Pharmacetical	68.00	4.62	6.19	10.97	0.94
2012	Glaxosmithkline Nig	18.00	Ngse	Pharmacetical	45.10	-0.88	5.98	11.77	-0.63
2011	Glaxosmithkline Nig	18.00	Ngse	Pharmacetical	23.00	-5.08	3.64	14.27	-0.81
2010	Glaxosmithkline Nig	18.00	Ngse	Pharmacetical	26.00	-8.77	0.02	7.47	5.70
2016	Greif Nig	19.00	Ngse	Pack	10.88	0.00	6.11	13.96	0.01
2015	Greif Nig	19.00	Ngse	Pack	11.48	0.00	4.59	4.57	0.01
2014	Greif Nig	19.00	Ngse	Pack	12.08	0.00	0.33	10.80	0.01
2013	Greif Nig	19.00	Ngse	Pack	12.68	0.00	6.19	10.97	0.01
2012	Greif Nig	19.00	Ngse	Pack	12.98	0.00	5.98	11.77	0.03
2011	Greif Nig	19.00	Ngse	Pack	13.28	0.00	3.64	14.27	-0.10
2010	Greif Nig	19.00	Ngse	Pack	15.03	0.00	0.02	7.47	0.00
2016	Julius Berger	20.00	Ngse	Const	38.58	10.23	6.11	13.96	-0.20
2015	Julius Berger	20.00	Ngse	Const	42.00	12.18	4.59	4.57	0.88
2014	Julius Berger	20.00	Ngse	Const	60.66	0.00	0.33	10.80	-0.40
2013	Julius Berger	20.00	Ngse	Const	72.29	4.77	6.19	10.97	0.64
2012	Julius Berger	20.00	Ngse	Const	34.65	5.00	5.98	11.77	0.09
2011	Julius Berger	20.00	Ngse	Const	31.60	-17.77	3.64	14.27	-2.57
2010	Julius Berger	20.00	Ngse	Const	50.00	0.04	0.02	7.47	1.02
2016	Nigerian Northen Flour Mill	21.00	Ngse	Food	6.27	9.81	6.11	13.96	0.36
2015	Nigerian Northen Flour Mill	21.00	Ngse	Food	8.55	-4.89	4.59	4.57	0.12
2014	Nigerian Northen Flour Mill	21.00	Ngse	Food	18.05	-5.00	0.33	10.80	-0.28
2013	Nigerian Northen Flour Mill	21.00	Ngse	Food	23.16	-4.97	6.19	10.97	0.47
2012	Nigerian Northen Flour Mill	21.00	Ngse	Food	18.38	-0.27	5.98	11.77	0.01
2011	Nigerian Northen Flour Mill	21.00	Ngse	Food	21.48	0.00	3.64	14.27	-0.75
2010	Nigerian Northen Flour Mill	21.00	Ngse	Food	39.88	-0.25	0.02	7.47	0.38
2016	Okomu Oil Palm	22.00	Ngse	Plant	40.17	10.97	6.11	13.96	0.17
2015	Okomu Oil Palm	22.00	Ngse	Plant	30.30	12.64	4.59	4.57	0.40
2014	Okomu Oil Palm	22.00	Ngse	Plant	25.35	-15.50	0.33	10.80	-0.30
2013	Okomu Oil Palm	22.00	Ngse	Plant	44.00	3.77	6.19	10.97	-2.37
2012	Okomu Oil Palm	22.00	Ngse	Plant	42.50	25.00	5.98	11.77	0.89
2011	Okomu Oil Palm	22.00	Ngse	Plant	23.10	-2.04	3.64	14.27	-0.22

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2010	Okomu Oil Palm	22.00	Ngse	Plant	15.20	9.35	0.02	7.47	0.05
2016	Redstar Express	23.00	Ngse	Transp	4.40	-1.12	6.11	13.96	-0.41
2015	Redstar Express	23.00	Ngse	Transp	4.25	6.25	4.59	4.57	1.08
2014	Redstar Express	23.00	Ngse	Transp	3.94	-2.48	0.33	10.80	-0.47
2013	Redstar Express	23.00	Ngse	Transp	4.42	5.24	6.19	10.97	0.87
2012	Redstar Express	23.00	Ngse	Transp	3.00	-0.99	5.98	11.77	0.58
2011	Redstar Express	23.00	Ngse	Transp	2.39	4.37	3.64	14.27	0.46
2010	Redstar Express	23.00	Ngse	Transp	2.88	-1.71	0.02	7.47	1.84
2016	Total Nigeria	24.00	Ngse	Oil	299.00	15.49	6.11	13.96	1.33
2015	Total Nigeria	24.00	Ngse	Oil	147.01	1.34	4.59	4.57	0.31
2014	Total Nigeria	24.00	Ngse	Oil	142.50	-9.51	0.33	10.80	-0.84
2013	Total Nigeria	24.00	Ngse	Oil	170.00	3.02	6.19	10.97	0.22
2012	Total Nigeria	24.00	Ngse	Oil	120.57	-3.30	5.98	11.77	0.13
2011	Total Nigeria	24.00	Ngse	Oil	188.10	-5.95	3.64	14.27	-0.94
2010	Total Nigeria	24.00	Ngse	Oil	234.00	-0.26	0.02	7.47	1.49
2016	Trans-Nationwide Express	25.00	Ngse	Transp	1.00	-6.54	6.11	13.96	-0.53
2015	Trans-Nationwide Express	25.00	Ngse	Transp	1.13	10.78	4.59	4.57	1.30
2014	Trans-Nationwide Express	25.00	Ngse	Transp	1.23	-4.65	0.33	10.80	-4.91
2013	Trans-Nationwide Express	25.00	Ngse	Transp	1.17	-4.10	6.19	10.97	-0.17
2012	Trans-Nationwide Express	25.00	Ngse	Transp	2.78	-4.79	5.98	11.77	-0.18
2011	Trans-Nationwide Express	25.00	Ngse	Transp	3.45	0.00	3.64	14.27	-0.99
2010	Trans-Nationwide Express	25.00	Ngse	Transp	6.40	0.00	0.02	7.47	0.02
2016	Vitafoam Nig	26.00	Ngse	Hoshold	2.40	0.00	6.11	13.96	-1.10
2015	Vitafoam Nig	26.00	Ngse	Hoshold	5.41	10.41	4.59	4.57	1.61
2014	Vitafoam Nig	26.00	Ngse	Hoshold	4.03	4.68	0.33	10.80	-1.30
2013	Vitafoam Nig	26.00	Ngse	Hoshold	4.90	6.52	6.19	10.97	0.62
2012	Vitafoam Nig	26.00	Ngse	Hoshold	3.66	2.81	5.98	11.77	-0.73
2011	Vitafoam Nig	26.00	Ngse	Hoshold	5.06	5.42	3.64	14.27	0.48
2010	Vitafoam Nig	26.00	Ngse	Hoshold	6.66	7.42	0.02	7.47	1.79

APPENDIX B

Empirical Results

DESCRIPTIVE STATISTICS

```
   stats |  stock_~s  market~s  free_r~e      beta
---------+--------------------------------------------
    mean |  .7270879  3.837143  10.54429  .2078022
     p50 |         0      4.59     10.97       .05
     max |      57.2      6.19     14.27       7.49
     min |    -50.16       .02      4.57    -13.81
      sd |  10.39977  2.478659  3.225802  1.904334
skewness |  .4807739 -.6028233 -.6384747 -1.586072
kurtosis |  10.85942  1.692664   2.26016  20.39744
       N |       182       182       182       182
-------------------------------------------------------
```

CORRELATION ANALYSIS

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```
             | stock_~s market~s free_r~e     beta
-------------+------------------------------------
stock_retu~s |   1.0000
market_ret~s |   0.1031   1.0000
free_risk_~e |  -0.0989   0.3054   1.0000
        beta |   0.1166  -0.0297  -0.1129   1.0000
```

CAPM FIXED EFFECT RESULTS FOR MANUFACTURING COMPANIES

```
Fixed-effects (within) regression               Number of obs      =       182
Group variable: cross                           Number of groups   =        26

R-sq:  within  = 0.1525                         Obs per group: min =         7
       between =      .                                       avg =       7.0
       overall = 0.1330                                       max =         7

                                                F(1,155)           =     27.89
corr(u_i, Xb)  = 0.0000                         Prob > F           =    0.0000

------------------------------------------------------------------------------
Firm_Excess_~t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+--------------------------------------------------------------Market_Premium |    1.194699   .2262196      5.28    0.000      .7478279
1.64157
       _cons |   -1.80418   1.701736    -1.06   0.291    -5.165767    1.557407
---------------+--------------------------------------------------------------
       sigma_u |   4.068595
       sigma_e |  10.395272
          rho |   .1328367   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(25, 155) =     1.07                 Prob > F = 0.3807
```

CAPM RANDOM EFFECT RESULTS

```
Random-effects GLS regression                   Number of obs      =       182
Group variable: cross                           Number of groups   =        26

R-sq:  within  = 0.0000                         Obs per group: min =         7
       between = 0.0000                                        avg =       7.0
       overall = 0.1330                                        max =         7

                                                Wald chi2(1)       =     27.89
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

------------------------------------------------------------------------------
Firm_Excess_~t |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
---------------+--------------------------------------------------------------
Market_Premium |   1.194699   .2262196     5.28   0.000      .751317    1.638081
       _cons |   -1.80418   1.714302    -1.05   0.293     -5.16415     1.55579
---------------+--------------------------------------------------------------
       sigma_u |  1.0564476
       sigma_e |  10.395272
          rho |  .01022261   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Hausman test

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	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	re	fe	Difference	S.E.
Market_Pre~m	1.194699	1.194699	-3.11e-15	1.69e-08

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 0.01
Prob>chi2 = 0.9900