Capital Asset Pricing Model (CAPM): Evidence from Nigeria

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Abstract
In this paper, we apply the Capital Asset Pricing Model (CAPM) to the Nigerian stock market using weekly stock returns from 110 companies listed on the Nigerian stock exchange (NSE) from January 2007 to February 2010. In order to enhance the precision of the beta estimates and reduce the statistical problems that arise from measurement errors in individual beta estimates, the securities were combined into portfolios. The results generally invalidate the CAPM's predictions that higher risk (beta) is associated with a higher level of return and that the intercept should be equal to zero when estimating SML. The claim by the CAPM that the slope of the Security Market Line (SML) should equal the excess return on the market portfolio is also not supported by this study. This in effect, invalidates the prediction of the CAPM as far as Nigeria is concerned.
Keywords: CAPM, Nigerian Stock Exchange, Returns, Portfolio Returns, Beta, Risk-free rate, Stocks, Anomalies

1. Introduction

The emergence of new stock markets globally and the big, and sometimes astonishing, returns offered by these markets have attracted the attention of investors and financial researchers around the world in recent times. It is therefore unsurprising that many models and approaches are employed by researchers, professionals and other knowledgeable stakeholders worldwide in selecting portfolio in order to appraise the risk exposure to different assets.

The capital asset pricing model (CAPM), developed by Sharpe (1964), Lintner (1965) and Mossin (1966) is generally believed to symbolize the beginning of asset pricing theory. Its importance is so great that about four decades after the seminal works by the authors, the CAPM is still used extensively. Specifically, it is employed in applications, like the estimation of the cost of capital for firms and the evaluation of the performance of managed portfolios. It is also an important topic in finance based course curricula worldwide. The model's importance is such that the Nobel Prize in economics given to Sharpe in 1990 was largely on the strength of the CAPM. According to Fama and French (2004) the attraction of the CAPM is its offering of potent and intuitively satisfying prediction regarding the measurement of risk and the link between expected return and risk.

In spite of its popularity, importance and extensive usage in academics and the real financial world over time, empirical support for the model is poor, casting doubt about its capacity to elucidate on the actual movements of asset returns. Its shortcomings have also threatens the way it is used in applications. The CAPM postulates that the expected return on an asset above the risk-free rate is linearly related to the non-diversifiable risk as measured by the asset's beta.

This study examines the validity or otherwise of the propositions of the CAPM in the Nigerian stock market in the aftermath of the global economic crisis. The revelations of manipulations in the Nigerian stock market in recent times, culminating in unbelievable returns, also suggests the need to ascertain the validity of the major asset pricing model in use in the Nigeria. This will help the country to get the capital market and indeed the whole economy back on track. The study is also imperative in view of the paucity of empirical studies on CAPM in Nigeria. Tests are conducted on weekly data for a period of about three years from January 2007 to February 2010. This period is characterized by huge returns as well as intense return volatility. It covers a period that witnessed historically high returns in the Nigerian Stock market as well as significant decrease in asset returns over the examined period. These market return characteristics help in carrying out an empirical inquiry into the pricing model on conflicting financial conditions and consequently obtain conclusions under varying stock return volatility.

This paper is divided into five sections. After this introductory section, we review theoretical and extant empirical studies relating to CAPM in section 2. Thereafter in section 3, the methodology employed in this study is stated. Moreover, empirical results and findings of this study are presented in section 4 while section 5 concludes.

2. Theoretical framework and Literature Review

2.1. Theoretical Framework

The CAPM is an integral part of the development of the modern capital market theory and is an offshoot of the general equilibrium models of the determination of the prices of capital assets under conditions of uncertainty. Indeed, the seminal works of Markowitz (1952, 1959) on portfolio selection resulted in a revolution in the theory of finance and laid the foundation for modern capital market theory. His treatment of investor portfolio selection as a problem of utility maximization under conditions of uncertainty is a path breaking contribution. Markowitz deals mainly with the special case in which investor preferences are assumed to be defined over the mean and variance of the probability distribution of single-period portfolio returns, but it is clear that he is aware of the very special nature of these assumptions. Markowitz's treatment of the portfolio problem is completely normative but positive implications from his approach for the general equilibrium models of asset prices are derived by Treynor (1961), Sharpe (1964), Lintner (1965), and Mossin (1966).

Sharpe (1964) and Lintner (1965) turn the Markowitz mean-variance portfolio model into a testable prediction about the relation between risk and expected return by identifying a portfolio that must be mean-variance-efficient. The Sharpe – Lintner CAPM equation is given as:

$$E(R_i) = R_f + [E(R_M) - R_f)]\ \beta_{iM}, \qquad i=1,\ldots,N. \qquad (2.1)$$

This states that the expected return on any asset i is the riskfree interest rate, R_f, plus a risk premium, which is the asset's market beta, β_{iM}, times the premium per unit of beta risk, $E(R_M) - R_f$.

The Sharpe – Lintner CAPM is a ceteris paribus model and it is only valid within the following set of assumptions:

- Investors are risk averse individuals who maximize the expected utility of their end of period wealth. This implies that the model is a one-period model.
- Investors are price takers and have homogenous expectations about securities (or assets) returns that have a joint normal distribution.
- There exists a risk free security (or asset) such that investors may borrow or lend unlimited amount at the risk-free rate.
- The quantities of securities (or assets) are free. Also, all securities (or assets) are marketable and perfectly divisible.
- Securities (or the asset) markets are frictionless. Information is costless and simultaneously available to all investors.
- There are no market imperfections such as taxes, regulations, or transaction costs. There are negligible restrictions on investment and no investor is large enough to affect the market price of the stock. (Olowe, 1997).

Black (1972) develops a version of the CAPM without riskfree borrowing or lending. He shows that the CAPM's key result – that the market portfolio is mean-variance-efficient – can be obtained by instead allowing unrestricted short sales of risky assets. With unrestricted short-selling of risky assets, portfolios made up of efficient portfolios are themselves efficient.

Fama and French (2004) however believe that the assumption that short selling is unrestricted is as unrealistic as unrestricted riskfree borrowing and lending. If there is no riskfree asset and short-sales of risky assets are not allowed, mean-variance investors will still choose efficient portfolios. But basically all attractive models involve impractical simplifications, which is why they must be tested against data.

2.2. Empirical review

Early empirical work, such as Black, Jensen, and Scholes (1972) and Fama and MacBeth (1973) somewhat support the Sharpe-Lintner CAPM. They show that a linear and direct relationship exist between higher risk (beta) and higher level of return. The slope however is flat and does not seem to conform to the Sharpe-Lintner CAPM. Generally, the empirical results of the early studies of the Sharpe – Lintner version of the CAPM are discouraging as studies such as Douglas (1968), Miller and Scholes (1972) and Blume and Friend (1973) reject the CAPM.

Attempts at providing explanations to the poor empirical results on the return-beta relationship are found in the literature. For instance, Fama and MacBeth (1973), Ross (1977), Black (1993) and Chan and Lakonishok (1993) show that the single-factor CAPM is rejected when the portfolio used as a market proxy is inefficient. Indeed, Roll and Ross (1994), and Kandel and Stambaugh (1995) reveal that a slight deviations from efficiency can result in an insignificant correlation between risk and expected returns. Also, Kothari, Shanken and Sloan (1995) highlight the survivorship bias in the data used to test the validity of the asset pricing model specifications. Bos and Newbold (1984), Faff, Lee and Fry (1992), Brooks, Faff and Lee (1994) and Faff and Brooks (1998) on their part, find that Beta is unstable over time. Many studies have also identified several model specification issues. Kim (1995) and Amihud, Christensen and Mendelson (1993), for instance, argue that errors in variables impact on the empirical research while Kan and Zhang (1999) focus on a time-varying risk premium.

Moreover, Jagannathan and Wang (1996) show that specifying a broader market portfolio can affect the results. In addition, Clare, Priestley and Thomas (1998) argue that failing to take into account possible correlations between idiosyncratic returns may have an impact on the results. Mostly in the 1980s and 1990s, a lot of "anomalies" or departures from the CAPM were however identified in the literature. These include: the “Size” effect (Banz, 1981; Reinganum, 1981; Fama & French, 1992), “Value” effect (Basu, 1983; Rosenberg, Reid, & Lanstein, 1985; Fama & French, 1992), “Contrarian” effect (DeBondt & Thaler, 1985) and “Continuation” or “Momentum” effect (Jegadeesh & Titman, 1993). Others include, Calendar anomalies such as “Turn-of-the-year” effect (Keim, 1983; & Reinganum, 1983), “weekend” effect (French, 1980), “Day-of-the-week” effect (Osborne, 1962; Cross, 1973; Jaffe & Westerfield, 1985) and “January” effect (Wachtel, 1942; Haugen & Lakonishok, 1988). As noted by Schwert (2002) most of these anomalies weakened or disappeared after the publication of the papers that gave them prominence, thereby implying that they are more apparent than real.

Many empirical studies thus show that some other variables apart from beta can be usefully employed to explain the cross section of returns. These include: earnings-price ratios (Basu, 1977, 1983), Market Equity (ME) (Banz, 1981), leverage (Bhandari, 1988), ratio of a firm’s book value to market equity (BE/ME) (Rosenberg, Reid, & Lanstein, 1985), BE/ME and cash flow/price ratio (C/P) (Lakonishok, Sheifer, & Vishny, 1994). Of greater empirical importance is the identification of market β, firm Size (ME), (E/P), financial leverage and BE/ME by Fama and French (1993, 1996) as providing possible explanations for the returns in both stocks and bonds. They indeed show in the Three Factor Model (TFM) that the Size and BE/ME factors explain the cross sectional differences in average stock returns.

Several studies such as Chan, Hamao and Lakonishok (1991), Drew, Naughton and Veeraragavan (2005), Chan and Chui (1996), Strong and Xu (1997), Al-Horani, Pope and Stark (2003) provide support for Fama and French TFM. On the contrary, Kothari, Shanken and Sloan (1995) claims that the TFM suffers from survivorship bias while Mackinlay (1995) is of the opinion that the results may be based on data snooping given the variable construction for the characteristics based portfolios. Although the TFM has generated intense debate in the literature over the years, there seems to be is a consensus that the market β alone cannot describe the cross section of expected stock returns (Miller, 1999). Carhart (1997) extend the Fama and French TFM to take account of a portfolio of stocks with high returns over the past few months, culminating in a four-factor model.

In addition, Fabozzi and Francis (1977) in estimating and testing the stability of betas over the bull and bear markets, find no evidence supporting beta instability. Kim and Zumwalt (1979) conclude that downside risk might be a more appropriate measure of portfolio risk than the conventional single beta. Chen (1982) confirms this by allowing beta to be nonstationary in an examination of the risk-return relationship in the up and down markets. Crombez and Vander Vennet (2000) show that the beta factor is a robust and consistent gauge of both upward potential in bull markets and downside risk in bear markets. They find the results to be robust for various definitions of beta and different specifications of up and down markets.

A study of the nexus between the returns and higher-order systematic co-moments in the up and down markets by Galagedera and Silvapulle (2002) reveal that the expected excess rate of return is related to both beta and systematic co-skewness. Also, Bollerslev, Engle and Wooldridge (1988) use the ARCH-based empirical models to provide evidence of the risk-return relationship. Moreover, using betas obtained through Quantitative Threshold ARCH (QTARCH) and GARCH-M models, among others, Fraser, Hamelink, Hoesli, & MacGregor (2000) indicate that CAPM performs better in downward moving markets than in upward markets. They are also of the opinion that it is more suitable to use beta as a risk measure in the bear markets.

3.0. Methodology

3.1. Sample and Data Selection

The study uses returns from 110 stocks quoted on the Nigerian Stock Exchange (NSE) and they are included in the formation of the NSE Allshare Index for the period of January 2007 to February 2010. This index is designed to provide real-time measures of the NSE. All securities included in the indices are traded on the NSE on a continuous basis throughout the full NSE trading day. Each series consists of 166 observations of the weekly closing prices. The time period was chosen because it is characterized by intense return volatility with historically high and low returns for the NSE.

The data were obtained from NSE database and all stocks returns are adjusted for dividends as stipulated by the CAPM. In order to obtain better estimates of the value of the beta coefficient, we use weekly stock returns. Returns calculated using a longer time period (e.g. monthly) might result in changes of beta over the examined period, thereby, introducing biases in beta estimates. On the other hand, high frequency data such as daily observations covering a relatively short and stable time span can result in the use of very noisy data and thus yield inefficient estimates. Akintola-Bello (2004) also observes that there is no theoretically correct time interval for analysis. The sample size is based on the rationale of having sufficient information to efficiently estimate the market model and to ensure that the data is not going too far back in time. Thus, a trade off between enough observations to eliminate the impact of random rates of returns and an excessive length of time over which the

subject company may have changed dramatically would be required.
The NSE All share index is used as a proxy for the market portfolio. This index is a market value weighted index and reflects general trends of the Nigerian stock market.
Furthermore, the 1-month Nigerian Treasury Bill rate is used as the proxy for the risk-free asset. The yields were obtained from the Central Bank of Nigeria (CBN) website. The yield on the 1-month Treasury bill is specifically chosen as the benchmark that better reflects the short-term changes in the Nigerian financial markets.

3.2. Estimation Procedure

This study follows the procedure of Mihailidis, Tsopoglou, Papanastasiou, & Mariola (2006). The starting point is the estimation of a beta coefficient for each stock using weekly returns during the estimation period. We estimate the beta by regressing each stock's weekly return against the market index according to the following equation:

$R_{it} – R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + \varepsilon_i$ (3.1)

where:
R_{it} = return on security i (I = 1 . . . 110)
R_{ft} = rate of return on risk-free security
R_{mt} = the rate of return on market index,
β_i = the estimate of beta for the security i, and
ε_i = the corresponding random disturbance term in the regression equation

Thereafter, the average portfolio excess returns of stocks (r*pt*) is computed and ordered according to their beta coefficient obtained by Equation 3.1. Let,

$$r_{pt} = \frac{\sum_{i=1}^{k} r_{pt}}{k} \quad (3.2)$$

k = the number of stocks included in each portfolio (k =1…11),
p = the number of portfolios (p=1…10),
r_{it} = is the excess return on stocks that form each portfolio comprised of k stocks each.
Using this formula, we obtain 10 equally-weighted portfolios containing 11 stocks each.
Although portfolios can be formed through ranking of stocks using the true beta, what is however available is the observed or estimated beta. It is generally accepted that due to some statistical factors, the estimated betas using the regression analysis are not unbiased estimates of the underlying beta of a firm's securities. The underlying beta is likely to be closer to 1 than the sample estimate. To correct for this bias, research in both universities and investment firms has produced a variety of techniques to adjust the beta values. We have adopted the technique developed by Merrill Lynch. After using ordinary least squares to gain a preliminary estimate of beta, using 60 monthly returns, the company then adjusts beta as follows:

Adjusted beta = 2/3 sample Beta + 1/3 (1) or Raw Beta (0.67) + 1(0.33). (3.3)

The formula pushes high betas down towards 1.0 and low betas up towards 1.0. Using this technique, the revised estimates are shown under the column "adjusted Beta" in the table. Note that the revised estimates have been pulled closer to the market average of 1.0. By adjusting the beta, we are drawing on empirical evidence that suggests that the betas for most companies over time tend to move toward the average beta, which is 1.0. This may be explained by the fact that firms get more diversified in their product mix and client base as they get larger. (Akintola-Bello 2004).
We further employ the following equation to estimate portfolio betas:

$r_{pt} = \alpha_p + \beta_{p\,.} . r_{mt} + \varepsilon_{pt}$ (3.4)

where:
r_{pt} = the average excess portfolio return,
β_p = the calculated portfolio beta.
$r_{mt} = R_{mt} - R_{ft}$

Furthermore, we estimate the ex-post Security Market Line (SML) by regressing the portfolio returns against the portfolio betas obtained by Equation 3.4. The relation examined is the following:

$r_p = \lambda_0 + \lambda_1 \beta_{p\,.} + \varepsilon_{pt}$ (3.5)

where:
r_p = the average excess return on a portfolio p (the difference between the return on the portfolio and the return on a risk-free asset),
β_p = an estimate of beta of the portfolio p ,
λ_1 = the market price of risk, the risk premium for bearing one unit of beta risk,
λ_0 = the zero-beta rate, the expected return on an asset which has a beta of zero, and
ε_p = random disturbance term in the regression equation.

4. Empirical results and Interpretation of the findings

Firstly, we estimate betas for individual stocks by using observations on rates of return for a sequence of dates and the betas are presented in table 1 below. The range of the estimated stock betas is 1.9587 between the minimum -0.323730 and the maximum of 1.634970. (See Table 1).

We proceed to test certain hypotheses of the CAPM in this study. Firstly, the CAPM indicates that higher risk (beta) is associated with a higher level of return. This, however, is not supported by the results of this study. Although there is no exact negative relationship, some portfolios with higher returns have lower betas. For example, the portfolio with the highest returns (portfolio A) has the second lowest beta while the portfolio with the lowest returns (portfolio G) has the highest beta.(See table 2).Similarly, portfolio J, which is the second lowest in terms of returns (9^{th} out of 10), has the second highest beta.

To test the CAPM hypothesis, the yield on the 1-month Nigerian Treasury Bills is used as an approximation of the risk-free rate (Rm) while the NSE Allshare index is taken as the best approximation for the market portfolio. The basic equation used is $r_p = \lambda_0 + \lambda_1 . \beta_p + \varepsilon_{pt}$ (Equation 3.5)

where:

λ_0 = the expected excess return on a zero beta portfolio and

λ_1 = the market price of risk, the difference between the expected rate of return on the market and a zero beta portfolio.

Since the CAPM indicates that the intercept is zero for every asset, an intercept is therefore added in the estimation of the SML to ascertain whether the CAPM holds true or not.

In order to enhance the precision of the beta estimates, the securities were combined into portfolios to mitigate the statistical problems that arise from measurement errors in individual beta estimates.

In addition, we combine the securities into portfolios to enhance the accuracy of the beta estimates and reduce the statistical problems that occur from measurement errors in individual beta estimates.

According to the CAPM, the intercept (λ_0) should be equal to zero when estimating SML. In table 3 below, however, the intercept has a value less than zero (-1.784374). The table also indicates that the intercept of the SML (-1.784374) is less than the interest rate on risk free security of 0.0606. These results are obviously inconsistent with the zero beta version of the CAPM

Also, according to CAPM, the SML slope should equal the excess return on the market portfolio. The excess return on the market portfolio is -6.1943 while the estimated SML slope (as shown in table 3 below).is -3.932879. This in effect, invalidates the prediction of the CAPM.

5. Conclusion

In applying the CAPM to the Nigerian stock market, we employ weekly stock returns from 110 companies listed on the Nigerian Stock Exchange (NSE) from January 2007 to February 2010. In order to enhance the precision of the beta estimates and reduce the statistical problems that arise from measurement errors in individual beta estimates, the securities were combined into portfolios. The results generally invalidate the CAPM's predictions that higher risk (beta) is associated with a higher level of return and that the intercept should be equal to zero when estimating SML. The claim by the CAPM that the SML slope should equal the excess return on the market portfolio is also not supported by this study. This in effect, invalidates the prediction of the CAPM as far as Nigeria is concerned.

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APPENDIX

Table 1: Stock Beta Coefficient Estimates (Equation 7)

SN	STOCK	ESTIMATED BETA	SN	STOCK	ESTIMATED BETA	SN	STOCK	ESTIMATED BETA
1	ACCESS	1.401958	38	NGC	0.373727	75	GUINEAINS	1.159587
2	AFRIBANK	1.152827	39	HALLMARK	0.071837	76	AIICO	1.382097
3	DIAMOND BANK	1.634970	40	THOMASWY	0.369342	77	LASACO	1.138105
4	ECOBANK	0.138387	41	TRIPPLEG	0.329618	78	LAWUNION	0.528827
5	FBN	1.282686	42	AGLEVENTIS	0.296331	79	MBENEFIT	1.325497
6	FCMB	1.077025	43	CHELLARAM	0.247608	80	NEM	1.350601
7	FIDELITY	1.144366	44	PZ	0.904864	81	NIGERINS	0.678400
8	GTB	1.185127	45	SCOA	0.363124	82	SOVRENINS	0.572588
9	IBTC	1.433214	46	TRANSCORP	0.754197	83	STDINSURE	0.566676
10	INTERCONT	1.213412	47	UACPROP	0.979791	84	UNIC	1.055487
11	OCEANIC	1.371573	48	UNILEVER	1.398913	85	WAPIC	1.025705
12	UBA	1.528682	49	COSTAIN	1.402038	86	AVONCROWN	-0.125650
13	UBN	1.231255	50	JBERGER	0.627473	87	AP	0.129380
14	WEMA	0.659794	51	CUTIX	0.473800	88	CAPOIL	-0.323730
15	ZENITH	1.544000	52	NIGWIRE	0.158469	89	CHEVRON	0.102820
16	BANK PHB	1.249757	53	SEVENUP	0.322800	90	CONOIL	0.244479
17	FIRST INLAND	1.057331	54	CADBURY	0.743810	91	ETERNAOIL	0.255556
18	SKYE BANK	1.558750	55	FLOURMILL	1.125882	92	MOBIL	-0.088091
19	SPRING	0.182463	56	NASCON	1.424284	93	OANDO	0.466430
20	STERLING	1.119781	57	NBC	0.680916	94	TOTAL	0.091272
21	UNITY	1.619625	58	NESTLE	0.405767	95	LONGMAN	0.471707
22	LIVESTOCK	1.210733	59	UNIONDICON	0.202608	96	UPL	0.700645
23	OKOMUOIL	0.279104	60	UTC	0.321328	97	ADSWITCH	0.048216
24	PRESCO	0.636794	61	ETI	0.583286	98	ALUMACO	-0.110470
25	DNMEYER	0.348415	62	DNMEYER	0.348415	99	AFPRINT	0.329089
26	RTBRISCOE	0.478724	63	EVANSMED	0.661472	100	ALEX	-0.025679
27	GUINNESS	0.736219	64	GLAXOSMITH	0.700436	101	CAPALBETO	0.051305
28	INTERBRW	0.365986	65	MAYBAKER	0.941298	102	CHAMPION	0.061051
29	JOSBREW	0.230414	66	NEIMETH	0.461198	103	CILEASING	0.117288
30	NBL	0.773881	67	BOCGASES	0.253645	104	GCAPPA	-0.085314
31	ASHAKACEM	1.432629	68	ENAMELWA	0.022566	105	INCAR	-0.005873
32	BCC	0.941232	69	FIRSTALUM	0.385700	106	IPWA	1.610562
33	CCNN	0.888684	70	VITAFOAM	0.939297	107	LENNARDS	-0.147541
34	WAPCO	1.048831	71	VONO	0.344589	108	MORISON	-0.074100
35	AFRIPAINT	0.234990	72	CORNERSTONE	1.116802	109	NCR	0.015512
36	BERGER	0.499297	73	CRUSADER	0.226669	110	NIGROPES	-0.132015
37	CAP	0.418180	74	GNI	0.526742			

Source: Author's computation 2011

Table 2: Average Excess Portfolio Returns and Betas (Equation 10)

SN	STOCK	AVERAGE PORTFOLIO EXCESS RETURNS OF STOCKS (r_{pt})	RANK (r_{pt})	ESTIMATED PORTFOLIO BETA (βp)	RANK (βp)	BETA SQUARE
1	PORTFOLIO A	1.04	1	-0.167866	9	0.028179
2	PORTFOLIO B	-0.90	2	-0.061683	8	0.003805
3	PORTFOLIO C	-4.63	5	-0.078132	10	0.006105
4	PORTFOLIO D	-4.81	7	0.776913	4	0.603594
5	PORTFOLIO E	-4.22	4	0.681157	6	0.463975
6	PORTFOLIO F	-3.87	3	0.624761	7	0.390326
7	PORTFOLIO G	-5.39	10	0.871640	1	0.759756
8	PORTFOLIO H	-4.82	8	0.778675	3	0.606335
9	PORTFOLIO I	-4.81	7	0.777500	5	0.604506
10	PORTFOLIO J	-5.38	9	0.868703	2	0.754645

Source: Author's computation 2011

Table 3: Statistics of the Estimation of the SML (equation 3.5)

Coefficient	**ALPHA (λ_0)**	**BETA (λ_1)**
Value	-1.784374	-3.932879
t-value	-2.550259	-3.651979
p-value	0.0342	0.0065
R^2: 0.625064; Adj R^2: 0.578197 F-statistics: 13.33695, Prob(F-statistic):: 0.006476 Jacque-Bera: 3.986893, Prob: 0.136225 Rf = 0.0606 $r_{mt} = R_{mt} - R_{ft} = -6.1943$		

Source: Author's computation 2011

Table 4: Portfolio Classification by Adjusted Beta

PORTFOLIO A			**PORTFOLIO B**		
STOCK	**ADJUSTED BETA**	**AVERAGE EXCESS RETURNS**	**STOCK**	**ADJUSTED BETA**	**AVERAGE EXCESS RETURNS**
C APOIL	0.11	1.04	NCR	0.34	0.77
LENNARDS	0.23	1.31	ENAMELWA	0.35	-4.23
NIGROPES	0.24	0.85	ADSWITCH	0.36	1.40
ABPLAST	0.24	1.11	CAPALBETO	0.36	0.97
AVONCROWN	0.25	1.52	CHAMPION	0.37	0.15
ALUMACO	0.26	1.92	HALLMARK	0.38	-5.22
MOBIL	0.27	-0.12	TOTAL	0.39	-0.02
GCAPPA	0.27	1.25	CHEVRON	0.40	-0.20
MORISON	0.28	1.88	CILEASING	0.41	0.92
ALEX	0.31	1.25	AP	0.42	0.42
INCAR	0.33	-0.58	ECOBANK	0.42	-4.92
	2.79	11.45		4.30	-16.69
	11.00	11.00		11.00	11.00
Average Portfolio Excess Returns of Stocks (r_{pt})	0.25	1.04	Average Portfolio Excess Returns of Stocks (r_{pt})	0.39	-1.52
PORTFOLIO C			**PORTFOLIO D**		
STOCK	**ADJUSTED BETA**	**AVERAGE EXCESS RETURNS**	**STOCK**	**ADJUSTED BETA**	**AVERAGE EXCESS RETURNS**
NIGWIRE	0.44	-5.97	AGLEVENTIS	0.53	-5.28
SPRING	0.45	-7.05	UTC	0.55	-5.92
UNIONDICON	0.47	-6.11	SEVENUP	0.55	-6.12
CRUSADER	0.48	-6.27	AFPRINT	0.55	0.76
JOSBREW	0.48	-5.78	TRIPPLEG	0.55	-4.87
AFRIPAINT	0.49	-4.62	VONO	0.56	-6.15
CONOIL	0.49	-0.21	DNMEYER	0.56	-5.57
CHELLARAM	0.50	-4.60	SCOA	0.57	-4.39
BOCGASES	0.50	-5.01	INTERBRW	0.58	-4.91
ETERNAOIL	0.50	0.78	THOMASWY	0.58	-5.24
OKOMUOIL	0.52	-6.12	NGC	0.58	-5.21
	5.41	-50.26		0.00	-53.18
	11.00	11.00		11.00	11.00
Average Portfolio Excess Returns of Stocks (r_{pt})	0.49	-4.57	Average Portfolio Excess Returns of Stocks (r_{pt})	0.56	-4.83

PORTFOLIO E			**PORTFOLIO F**		
STOCK	**ADJUSTED BETA**	**AVERAGE EXCESS RETURNS**	**STOCK**	**ADJUSTED BETA**	**AVERAGE EXCESS RETURNS**
FIRSTALUM	0.59	-5.65	STDINSURE	0.71	-0.08
NESTLE	0.60	-5.80	SOVRENINS	0.71	0.06
CAP	0.61	-5.76	ETI	0.72	-6.84
NEIMETH	0.64	-5.99	JBERGER	0.75	-5.77
OANDO	0.64	0.49	PRESCO	0.76	-6.03
LONGMAN	0.65	0.80	WEMA	0.77	-6.21
CUTIX	0.65	-5.55	EVANSMED	0.77	-6.56
RTBRISCOE	0.65	-6.34	NIGERINS	0.78	-0.41
BERGER	0.66	-5.73	NBC	0.79	-6.02
GNI	0.68	-6.58	GLAXOSMITH	0.80	-5.51
LAWUNION	0.68	-0.27	UPL	0.80	0.83
	7.06	-46.38		8.37	-42.55
	11.00	11.00		11.00	11.00
Average Portfolio Excess Returns of Stocks (r_{pt})	0.64	-4.22	Average Portfolio Excess Returns of Stocks (r_{pt})	0.76	-3.87
PORTFOLIO G			**PORTFOLIO H**		
STOCK	**ADJUSTED BETA**	**AVERAGE EXCESS RETURNS**	**STOCK**	**ADJUSTED BETA**	**AVERAGE EXCESS RETURNS**
GUINNESS	0.82	-5.80	WAPCO	1.03	-6.07
CADBURY	0.83	-6.20	UNIC	1.04	0.23
TRANSCORP	0.84	-7.37	FIRST INLAND	1.04	-6.62
NBL	0.85	-5.62	FCMB	1.05	-5.23
CCNN	0.93	-5.78	CORNERSTONE	1.08	-5.86
PZ	0.94	-5.79	STERLING	1.08	-6.17
VITAFOAM	0.96	-5.57	FLOURMILL	1.08	-5.94
BCC	0.96	-5.56	LASACO	1.09	0.26
MAYBAKER	0.96	-5.96	FIDELITY	1.10	-5.55
UACPROP	0.99	-5.47	AFRIBANK	1.10	-6.42
WAPIC	1.02	-0.23	GUINEAINS	1.11	-5.65
	10.08	-59.34		11.80	-53.00
	11.00	11.00		11.00	11.00
Average Portfolio Excess Returns of Stocks (r_{pt})	0.92	-5.39	Average Portfolio Excess Returns of Stocks (r_{pt})	1.07	-4.82
PORTFOLIO I			**PORTFOLIO J**		
STOCK	**ADJUSTED BETA**	**AVERAGE EXCESS RETURNS**	**STOCK**	**ADJUSTED BETA**	**AVERAGE EXCESS RETURNS**
GTB	1.12	-5.75	ACCESS	1.27	-5.53
LIVESTOCK	1.14	-5.51	COSTAIN	1.27	-4.57
INTERCONT	1.14	-6.72	NASCON	1.28	-0.97
UBN	1.15	-6.42	ASHAKACEM	1.29	-6.35
BANK PHB	1.17	-5.26	IBTC	1.29	-5.54
FBN	1.19	-6.26	UBA	1.35	-5.99
MBENEFIT	1.22	0.53	ZENITH	1.36	-5.93
NEM	1.23	0.20	SKYE BANK	1.37	-5.17
OCEANIC	1.25	-6.74	IPWA	1.41	-8.26
AIICO	1.26	-5.80	UNITY	1.42	-5.36
UNILEVER	1.27	-5.21	DIAMOND BANK	1.43	-5.48
	13.15	-52.94		14.75	-59.16
	11.00	11.00		11.00	11.00
Average Portfolio Excess Returns of Stocks (r_{pt})	1.20	-4.81	Average Portfolio Excess Returns of Stocks (r_{pt})	1.34	-5.38