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Capital Asset Pricing Model (CAPM) and Implication for a Developing Capital Market like Nigeria: A Case Study of the Quoted Banks on Nigeria Stock Exchange, January, 2013 – December, 2014.

REGINALD MADUKA, CHINWEZE
Department of Banking and Finance, Imo State University, Nigeria

Abstract
This paper is on Capital Asset Pricing Model (CAPM) and implication for a developing capital market like Nigeria. The study tests the predictive power of the CAPM in determining the required rate of return of the banking sector stocks in the Nigerian Stock Market as postulated by Sharpe (1964). Given the model of CAPM as $R_i = R_f + \beta(R_m - R_f)$, the beta was first estimated by regressing the monthly average prices against the NSE All Share index for each year and for each quoted bank and the CAPM returns for the fifteen banks quoted in the Nigerian stock Exchange were estimated from January, 2013 to December, 2014 covering a period of twenty four months. The actual rates of return for each of the banks stock was equally estimated and compared with the CAPM returns to find out if the stocks were correctly valued. This was done using secondary data from CBN Statistical Bulletin and the Nigerian Stock Exchange publications. The findings show that the CAPM is not a good predictor of stock returns in the banking sector as twelve of the fifteen banks shares were over-valued while three bank shares were under-valued.
Key words: Risk premium, stock Beta, CAPM required rate of return, Actual rate of stock return

1. Introduction

The mechanical complexity of the Markowitz's portfolio model kept both practitioners and academics away from adopting the concept for practical use. Its intuitive logic, however, spurred the creativity of a number of researchers who began examining the stock market implications that would arise if all investors use this model. As a result, what is referred to as the Capital Asset Pricing Model (CAPM) was developed, Bhalla (2011).

The capital asset pricing model (CAPM), developed independently by Sharpe (1964), Lintner (1965) and Mossin (1966) is generally believed to be the beginning of Asset Pricing Theory with a widespread agreement that it is a good predictor of share price movements in the stock market. Its importance is so great that after several years the works were presented by the authors, the CAPM is still used extensively. Specifically, it is employed in applications, such as the estimation of the cost of capital for firms and the evaluation of the performance of managed portfolios (valuation of securities). 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 the views of Oke(2013), it was the emergence of new stock markets globally and the big, and sometimes astonishing, returns offered by these markets that attracted the attention of investors and financial researchers around the world in recent times. It is therefore not surprising 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 including **Capital Asset Pricing Model.**

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, especially the unrealistic assumptions of market efficiency etc have also threatened 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 systematic (non-diversifiable) risk as measured by the asset's beta.

Although there are empirical evidences supporting the CAPM as a good predictor of share price movements in the stock markets of developed economies, Fama and French (2002), same have not been established of developing economies like Nigeria, Nwude and Eyisi (2013). However, the developments in the Nigerian Stock Exchange market which has witnessed market capitalization rise from 472.2 billion Naira in 2000 to 16,875.1 billion Naira in 2014 has made it imperative to take another critical look at the subject. This study therefore examines the validity or otherwise of the propositions of the CAPM in the Nigerian stock market with emphasis on the banking industry 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 Nigerian Stock Exchange. This will help the country to get the capital market and indeed the whole economy back on track. Besides, the study is also imperative in view of the paucity of empirical studies on CAPM in Nigeria.

1.2 Statement of the Problem

The capital asset pricing model postulates that the expected return on an asset above the risk-free rate is linearly related to the systematic (non-diversifiable) risk as measured by the asset beta. According to Fama and French (2004) the attraction of the CAPM is its offering of potent and initiatively satisfying predictions regarding the measurement of risk and the link between expected return and risk. All these gave the CAPM a widespread acceptance as a good predictor of share price movements in the Capital markets.

But while this has been empirically validated in several stock markets of developed economies, the same assertion cannot be made for the Nigerian economy (a developing economy). That is why this study will examine the validity of the CAPM propositions in the Nigerian stock market with particular reference to the Nigerian Banking sector. The choice of the Banking sector is informed by its dominance in the Nigerian stock market in terms of capitalization and volume.

1.3 Objectives of the Study

According to Ezirim (2005), the two dominant objectives of security evaluation is first, to determine the appraisal value, and second, to match it with the market price to ascertain whether or not the security is mis-priced. In the light of this assertion, this study aims at examining the validity of the proposition of the CAPM in the Nigerian stock exchange, January, 2013 to December, 2014 covering a period of 24months.

Specifically, the CAPM will be applied to the banking sector data and from the results infer whether the banking sector stocks returns were correctly priced. In other words whether the stock were correctly valued, overvalued or undervalued by the CAPM.

1.4 Research Question

Using the capital asset pricing model, are the Banking sector stocks, correctly valued, overvalued or undervalued?

1.5 Research Hypotheses

H_0: CAPM does not correctly value the prices of stocks of the quoted fifteen banks in the Nigerian Stock Exchange.

H_1: CAPM correctly values the prices of stocks of the quoted fifteen banks in the Nigerian Stock Exchange.

1.6 Scope and Limitations of the Study

The study will focus on assessing the validity of the CAPM proposition in valuing the stock prices in the Nigerian stock exchange with particular interest in the banking sector stocks. The study will focus on the 15 banks currently listed on the Nigerian stock exchange as at the time of investigation (business day, P.45, Wednesday 02 September, 2015) which include; Access bank, Diamond Bank, Ecobank, Fidelity, GTB, Skye bank, Sterling bank, UBA, Union bank, Unity bank, Wema bank, FCMB, Stanbic , first bank and Zenith bank.

The major limitation to the study is time constraint in collecting the required necessary data and the time needed for the numerous estimations of the relevant variables.

2. Theoretical framework and Literature Review

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.

The CAPM was developed by Sharpe (1964) in an attempt to simplify the individual portfolio theory as it relates to investment in securities. It states that the return on any asset or portfolio is related to the riskless rate of return and the expected return on the market in a linear fashion. It shows the relationship between expected return of a security and its unavoidable systematic risk thus, $R = Rf + \beta(Rm - Rf)$, where R = Expected rate of return on a security or a portfolio, Rf = Risk-free rate of return, Rm = Expected market rate of return, β = Systemic risk of the security (the beta) relative to that of the market.

This is only valid based on 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).

Nwude and Eyisi (2013) noted that the model recognizes only the systemic risk because it submits that it is the only risk which cannot be diversified away, i.e. systemic risk, that is worthy of being rewarded with a risk premium for financial valuation purposes. The remaining risk, i.e. unsystemic or diversifiable risk may be

reduced to zero by portfolio diversification and so it is not worthy of a risk premium. The line that reflects the combination of systemic risk and return available on alternative investments at a given time is called the security market line (SML). Any security that lies on the SML is being correctly priced. If there is temporary disequilibrium in the market and the return on some assets becomes higher than that given by the SML, then the security is underpriced. Under this market condition, if the market mechanism is working ideally, as investors demand more of such securities as super-good investment, the prices will continue to rise until that higher level of return reaches the SML value. Conversely if as a result of the market disequilibrium the level of return is lower than that given by the SML, then the security is overpriced. Under this market condition, if the market mechanism is working ideally, as investors sell-off more of such securities as super-bad investment, the prices will continue to fall until the level of return rises to that given by the SML value. Therefore, investors should select investments that are consistent with their risk preferences. While some investors consider only low risk investments, others welcome high risk investments. However, investors should sell overpriced securities, buy underpriced securities, and hold onto correctly priced securities. The key to this decision is that when actual return – CAPM required return = +ve alpha, the security is underpriced, when actual return – CAPM required return = zero alpha, the security is correctly priced, when actual return – CAPM required return gives positive value, the security is overpriced. The CAPM provides a framework for valuation of securities.

In the Capital Asset Pricing Model (CAPM), market risk of a risky asset or stock is measured by beta (β) which when multiplied by the Equity Market Risk Premium yields the total risk premium for a risky asset. That is, total equity risk premium for a risky asset (Rp) is equals to its beta multiplied by the equity risk premium (ERP) for the entire equity stock market portfolio (i.e. $Rp = \beta(Rm - Rf)$. Hence, from our definition of expected return, that for a risky asset at any point in time is represented by $Re = Rf + \beta(Rm - Rf)$. That is, ERP for the entire equity market is $Rm - Rf$ while that of a specific equity stock is $\beta i(Rm - Rf)$. Therefore, expected return on any risky investment = Risk-free Rate + Beta of the risky asset (ERP).

On the determinants of ERP are the risk aversions of investors, economic risk, information uncertainty, liquidity, and catastrophic risk. High risk aversion investors beget higher ERP. That is, the more the risk aversion the higher the ERP. As the risk aversion declines, ERP will fall. Investors risk aversion depends on age (Bakshi and Chen, 1994) and preferences for future or current consumption (Damodaran, 2011). The older the investors the more risk averse and the higher the ERP. The younger the investors the less risk averse and the lower the ERP. Investors' preference for current consumption over future consumption increases ERP. Conversely, Investors preference for future consumption over current consumption decreases ERP. That is, ERP increases as savings rate decreases and decreases as savings rate increases. On the impact of economic risk on ERP, the economy with predictable inflation, interest rates and economic growth should have lower ERP than one that is volatile in these variables. Lettau, Ludwigson and Wachter (2007) link the changing ERP in US to shifting volatility in the real economic variables which include employment, consumption and GDP growth. Individuals will choose a lower and more stable level of wealth and consumption that they can sustain over the long term over a higher level of wealth and consumption that varies widely from period to period. Constantinides (1990) notes that individuals become used to maintaining past consumption levels and that even small changes in consumption can cause big changes in marginal utility. Hence the stock returns are correlated with consumption, decreasing in periods when people have fewer goods to consume and the additional risk explains the higher observed ERP. Using dividend yield as proxy for risk premium they establish the close relationship between the volatility in GDP growth rate and the Dividend yield over a very long time period (1885-2005). Though studies that looked at the relationship between the level of inflation and ERP find little or no correlation, Brandt and Wang (2003), Modigliani and Cohn (1979) present evidence that ERP tend to increase if inflation is higher than anticipated or expected and decrease when it is lower than expected. Campbell and Voulteenaho (2004) related changes in dividend yield to changes in the inflation rate over time and find strong support for the findings of Brandt and Wang (2003), Modigliani and Cohn (1979). In the words of Damodaran (2011:9), reconciling the findings, it seems reasonable to conclude that it is not so much the level of inflation that determines ERP but uncertainty about that level.

According to Damodaran (2011:20), the most widely used approach to estimating ERP is the historical approach, where the actual returns earned on stocks over a long time period is estimated, and compared to the actual returns earned on a default-free (usually government security). The difference on an annual basis between the two returns is computed and represents the historical ERP. This approach is good given that we are almost looking at the same historical data. However, differences may occur between the Historical ERP and actual ERP being used in practice because of three reasons viz, different time periods for estimation, differences in index of measuring Risk-free rates and market return indices, differences in the way in which returns are averaged overtime. For the time period, the longer and more current the time period covered the lower the standard error of estimating ERP and the better the relevance to today's market. On risk-free estimation one can use either short term government securities (Treasury bills) or long term government securities (Treasury bonds). Larger ERP is obtained when using Treasury bills than the Treasury bonds. Some practitioners and academics use Treasury

bills rate as the risk-free rate with the alluring logic that there is no price risk in a Treasury bills whereas the price of a Treasury bond can be affected by changes in interest rates over time. This argument makes sense only if we are interested in a single period ERP, say for next year. If our time horizon is longer, say 5 or 10 years, it is Treasury bond that provides the more predictable returns. The third choice is to use Treasury bills rate plus term structure spread to get a normalized long term rate. In estimating market return, using the broadest market weighted index of stocks with a long history is good. On averaging to project the future ERP, the argument in corporate finance and valuation that using the GM presents a better picture than the AM is strong. This is because returns on stocks are negatively correlated, that is, good years are more likely to be followed by poor years and vice versa, and the AM is more likely to overstate the ERP. This is also why AM yields higher values than the GM. The GM is better for much longer period than a year (Fama and French, 1992).

Fernandez (2007:3) cited by Nwude and Eyisi (2013), states that the historical equity premium (HEP) is the historical average differential return of the market portfolio over the risk-free debt and this average differential return may be arithmetic or geometric mean. Different stock market indexes are used as the market portfolio and government bonds or bills of different maturities are used as risk-free debt. According to Fernandez (2007:4) , Ibbotson Associates (2006) used the income return (the portion of the total return that results from a periodic bond coupon payment) of the government bonds (5.2%) and average return on the S&P 500 (12.3%) to produce HEP of 7.1% for 1926-2005. In the same time period using Treasury bills rate of 3.8% they produced HEP of 8.5% under the arithmetic mean and 6.7% (i.e. 10.4-3.7) under the geometric mean. Ibbotson and Chen (2003) using the New York Stock Exchange (NYSE) database for 1926-2000 on historical equity returns conclude that the expected long term equity premium (relative to the long term government bond yield) is 5.9% arithmetically and 3.97% geometrically. Goetzmann, Ibbotson and Peng (2001) employed a new NYSE database for 1815-1925 to estimate the US equity returns and the HEP since 1792 (without dividend data in pre-1825 and incomplete in 1825-1871) and produced HEP relative to bonds of 3.76% arithmetically and 2.83% geometrically for 1792-1925, 6.57% arithmetically and 4.99% geometrically for 1926-2004. With Treasury bills rate they produced HEP of 8.63% arithmetically and 6.71% geometrically for 1926-2004. Dimson and Marsh (2001) calculated the geometric HEP for 1955-1999 of US, UK, Germany and Japan and obtained 6.2%, 6.2%, 6.3% and 7% respectively.

While historical ERP approach is backward-looking, the implied ERP approach is forward-looking. The implied ERP can be obtained using the intuition from the rate of return approach. Rate of return = cash flows/purchase cost. We can argue that ERP = rate of return = cash flows/current market price for equity. According to the Gordon (1962) model, the current price per share is the present value of expected dividends discounted at the required rate of return. Using Gordon (1962) model with perpetual sustainable constant stable growth rate in dividends and earnings, Value of equity = expected dividend next period/(required return on equity-expected growth rate) = D1/(k-g) = D(1 + g)/(k-g). From this model the implied required return on equity = [D(1+g)/value of equity]+g. Then subtracting the risk-free rate from the implied required return on equity yields an implied risk premium.

Black (1972), developed a version of the CAPM without risk-free 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 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. But basically all attractive models involve impractical simplifications, which is why they must be tested against data.

Empirical Literature.

According to Oke (2013) 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.

3. 0 RESEARCH METHODOLOGY

Nature and Sources of Data

Data for this study are of secondary nature. To compute the monthly average market prices for 24 months (2013 – 2014) the daily market prices of each of the subject firms' ordinary shares from 2013-2014 were used. To compute the actual rates of returns of the subject firms, the equity price appreciation or depreciation of the subject firms from 2013-2014 were required. To compute the rates of returns of the market, we need the NSE All-share Index (ASI) from 2013-2014. We also need the Nigerian Treasury Bill rates for each year from 2013-2014 to compute the risk-free rate of return. Therefore, in essence, we need for each subject firm the relevant daily market prices history. The stocks market prices and the NSE ASI were picked from the NSE daily official list for 2013-2014 while the Treasury Bills rates were picked from the CBN Statistical Bulletin 2013-2014.

3.2 Population and Sample

The population of this study is all quoted companies in Nigerian Stock market. The sample of study is all the quoted firms in the Banking sector of the Nigerian Stock Exchange from January, 2013- December, 2014.

3.3 Computation Methodology

Under the CAPM, the expected return as implied by the Capital Asset Pricing Model (CAPM) will be derived and compared with the actual return from each of the firms, to ascertain whether the stock is appropriately valued, undervalued, or overvalued. To accomplish this, it is necessary to derive value for each of the variables in the equation of the CAPM.

Estimation Procedures

The CAPM model is stated as follows:

$R_i = R_f + \beta(R_m - R_f)$

Where R = Expected rate of return on a security or a portfolio, R_f = Risk-free rate of return, R_m = Expected market rate of return, β = Systemic risk of the security (the beta) relative to that of the market.
For the purpose of this study, annual Federal Government Treasury Bill for the years January, 2013 - December 2014 is used as a proxy for R_f as a result of the short-term nature of the study. Further, the monthly average NSE All-Share Index for the period is used as a proxy for R_m.

3.3.1 Estimating the Expected Rate of Return

To adjust for risk the discount rate for each of the firms will be determined using the capital asset pricing model (CAPM) as in Arnold (2008:765). The message of CAPM is that if we know the risk free rate and the return on the whole market portfolio, the required rate of return on a risky asset will depend upon its beta coefficient, it tells us that the required rate of return on as asset is equal to the risk free rate plus a fraction (or multiple) or the market risk premium where the fraction (or multiple) is represented by the asset's beta coefficient. Thus, $K_i = R_f + \beta_i(R_m - R_f)$, where K_i = cost of equity i, which is also the expected required rate of return, R_f = risk free rate, β_i = each equity risk relative to the market, R_m = market rate of return.

3.3.2 Estimation of Risk Free Rate (R_f)

The risk free rate is that which could be earned on some zero-risk asset. Assets that have strictly zero risk are, in practice hard to find, but usually a three-month Federal Government of Nigeria (FGN) Treasury bill for short term and long term FGN bonds were used to represent risk free rate of interest. This is because the interest payable on any of the two is fixed, government is unlikely to default, and if the bill or bond is held to redemption, its maturity value is also certain. In this study the average rate of all the FGN Treasury bills issued for each year serves as a good proxy for risk free rate for each year under consideration.

3.3.3 Estimation of Beta Coefficient (β)

Beta coefficient measures the sensitivity of each of the stock's returns to movements in the market's return. It enables us to state what premium should be paid on each of the firms' equity shares by comparing each of them with that of the whole market portfolio. The beta (β) is estimated by regressing the monthly market returns of the

individual stocks against the monthly market returns of the entire market as represented by the NSE ASI. Here, the stock portfolios of the individual banks are used as the independent variables while the NSE ASI serves as the dependent variable. The beta is represented as follows: Y = a + bX (the regression line) where a is the intercept and b is the beta or slope. Merrill Lynch, also adopted by Akintola-Bello (2004), developed an adjustment procedure for the beta. This ensures that the statistical errors such as errors of approximations experienced with the regression analysis are eliminated. Therefore, after using the ordinary least squares to gain a preliminary estimate of beta, using 12 monthly returns in 2 separate years, he then adjusted the beta using the model, (βa) Adjusted beta = estimated beta (0.67) + 0.33.

This research also adopted the beta adjustment procedure in estimating the true beta.

According to Akintola-Bello (2004), the Actual Rates of Returns is estimated as: the return on a security is computed as $(D_t + P_t – P_{t-1})/P_{t-1}$, where D_t = dividend paid in period t, P_t= closing price in period t, P_{t-1} = Closing price in period t-1.

3.3.4 Estimation of Market Return (Rm)

The NSE All-Share-Index is used as a proxy for market rate of return. The NSE ASI was established on January 02, 1984 as a base date and set at 100 as a base value to which all subsequent values of the index can be related. It is a real time index because it is recalculated at the end of every trading day and captures the population of all listed shares.

3.3.5 Estimation of Actual Rates of Return

The rates of return on each share were obtained by computing the relative values of prices between a holding period (monthly) plus the yearly dividend yields. According to Akintola-Bello (2004:70), the return on a security is computed as $(D_t + P_t – P_{t-1})/P_{t-1}$, where D_t = dividend paid in period t, P_t= closing price in period t, P_{t-1} = Closing price in period t-1. The 12 monthly returns for each share were chain linked to obtain the annual return for each stock. Chain link simply means finding the geometric mean (GM) of the 12 monthly returns. According to Watsham and Parramore (2007:54) the geometric mean is the most appropriate measure of means when an average rate of change over a number of time periods is being calculated. It is a single measure of periodic growth rate which if repeated n times will transform the opening value into the terminal value. However, in this study, the actual rates of return on each share for each year were obtained by the GM of computed relative percentage increases in the values of prices for a 12-month holding period. The decision rules in gauging how CAPM best suits the Nigerian stocks are as follows. If CAPM computed return is equal to the actual return, the stock is normally valued by CAPM; if CAPM computed return is less than the actual return, the stock is undervalued by CAPM; If CAPM computed return is greater than the actual return, the stock is overvalued by CAPM.

The data were obtained from NSE database and all stocks returns are adjusted for dividends. 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.

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.

4. Empirical results and Interpretation of the findings

The CAPM Model is given as:

$R_i = R_f – (R_m - R_f)B$

First, we estimated betas for individual stocks by using observations on rates of return for a sequence of dates and the betas are presented in table A3 below.

Then we proceeded to estimate the CAPM returns and actual returns of the securities before testing the hypotheses of the CAPM for the fifteen banks under investigation. The study reveals that though the CAPM indicates that higher risk (beta) is associated with a higher level of return, it is however, not supported by the results of this study.

While some securities have negative relationships, others with higher returns have lower betas.

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.

4.1 Testing of the Hypothesis

In testing the research hypothesis, the result shows that CAPM does not hold true in estimating the stock prices of the quoted banks in the NSE. The results show that there were 18 over-valuations and 6 under valuations. 12 of the banks have their shares over-valued by the CAPM while 3 have theirs completely under-valued. The results of the various Banks under consideration are as presented below:

Table1: Estimating the CAPM hypotheses: FBN

Year	2013	2014
Adjusted Beta	1.18961	1.7332
CAPM	0.89	0.523
Actual Return	0.332	0.762
CAPM – Actual Return	-0.558	-0.239
Valuation Status	U	U

U – under-valued; O – Overvalued; P – perfectly valued.
Author's computation

Table2: Estimating the CAPM hypotheses: UBA

Year	2013	2014
Adjusted Beta	1.09887	1.2315
CAPM	0.7322	0.876
Actual Return	0.033	0.711
CAPM – Actual Return	0.7002	0.165
Valuation Status	O	O

U – unde-rvalued; O – Overvalued; P – perfectly valued.
Author's computation

Table3: Estimating the CAPM hypotheses: Access Bank

Year	2013	2014
Adjusted Beta	1.5377	1.783
CAPM	0.873	0.122
Actual Return	0.532	0.7011
CAPM – Actual Return	0.341	-0.5791
Valuation Status	O	U

U – under-valued; O – Overvalued; P – perfectly valued.
Author's computation

Table4: Estimating the CAPM hypotheses: Diamond Bank

Year	2013	2014
Adjusted Beta	1.7632	1.901
CAPM	0.98	0.7114
Actual Return	0.233	0.267
CAPM – Actual Return	0.747	0.444
Valuation Status	O	O

U – under-valued; O – Overvalued; P – perfectly valued.
Author's computation

Table5: Estimating the CAPM hypotheses: Unity Bank

Year	2013	2014
Adjusted Beta	0.8961	1.823
CAPM	1.977	0.872
Actual Return	0.4522	0.1101
CAPM – Actual Return	1.5248	0.762
Valuation Status	O	O

U – under-valued; O – Overvalued; P – perfectly valued.
Author's computation

Table6: Estimating the CAPM hypotheses: WEMA Bank

Year	2013	2014
Adjusted Beta	1.722	2.8773
CAPM	0.0988	0.7012
Actual Return	0.456	0.977
CAPM – Actual Return	-0.3572	-0.2758
Valuation Status	U	U

U – unde-rvalued; O – Overvalued; P – perfectly valued.
Author's computation

Table 7: Estimating the CAPM hypotheses: Sterling Bank

Year	2013	2014
Adjusted Beta	1.7223	1.2122
CAPM	0.8019	0.4105
Actual Return	0.3112	0.7057
CAPM – Actual Return	0.4907	-0.2952
Valuation Status	O	U

U – unde-rvalued; O – Overvalued; P – perfectly valued.
Author's computation

Table8: Estimating the CAPM hypotheses: Union Bank

Year	2013	2014
Adjusted Beta	1.7127	1.8722
CAPM	0.912	0.7221
Actual Return	0.661	0.322
CAPM – Actual Return	0.251	0.4001
Valuation Status	O	O

U – under-valued; O – Overvalued; P – perfectly valued.
Author's computation

Table9: Estimating the CAPM hypotheses: Skye Bank

Year	2013	2014
Adjusted Beta	1.4223	1.0122
CAPM	0.166	0.671
Actual Return	0.342	0.811
CAPM – Actual Return	-0.176	-0.14
Valuation Status	U	U

U – under-valued; O – Overvalued; P – perfectly valued.
Author's computation

Table10: Estimating the CAPM hypotheses: GTB

Year	2013	2014
Adjusted Beta	1.2221	0.2167
CAPM	0.0911	1.88
Actual Return	0.1441	0.1855
CAPM – Actual Return	-0.053	1.6945
Valuation Status	U	O

U – under-valued; O – Overvalued; P – perfectly valued.
Author's computation

Table11: Estimating the CAPM hypotheses: Fidelity Bank

Year	2013	2014
Adjusted Beta	1.6189	1.341
CAPM	0.890	1.882
Actual Return	0.323	0.727
CAPM – Actual Return	0.567	1.155
Valuation Status	O	O

U – under-valued; O – Overvalued; P – perfectly valued.
Author's computation

Table12: Estimating the CAPM hypotheses: FCMB

Year	2013	2014
Adjusted Beta	3.1101	1.633
CAPM	0.8091	0.5023
Actual Return	0.0012	0.7118
CAPM – Actual Return	0.8079	-0.2095
Valuation Status	O	U

U – under-valued; O – Overvalued; P – perfectly valued.
Author's computation

Table13: Estimating the CAPM hypotheses: Zenith Bank

Year	2013	2014
Adjusted Beta	1.18761	1.7342
CAPM	0.99	0.513
Actual Return	0.342	0.732
CAPM – Actual Return	0.648	-0.219
Valuation Status	O	U

U – under-valued; O – Overvalued; P – perfectly valued.
Author's computation

Table14: Estimating the CAPM hypotheses: Ecobank

Year	2013	2014
Adjusted Beta	1.6722	1.7332
CAPM	0.1221	0.503
Actual Return	0.332	0.762
CAPM – Actual Return	-0.2099	-0.259
Valuation Status	O	U

U – under-valued; O – Overvalued; P – perfectly valued.
Author's computation

Table15: Estimating the CAPM hypotheses: StanBIC IBTC

Year	2013	2014
Adjusted Beta	1.281	0.7132
CAPM	0.811	1.3211
Actual Return	0.071	0.751
CAPM – Actual Return	0.74	0.5701
Valuation Status	O	O

U – under-valued; O – Overvalued; P – perfectly valued.
Author's computation

5. Conclusion and Recommendations

In applying the CAPM to the Nigerian stock market, we employed monthly stock returns from 15 companies (banks) listed on the Nigerian Stock Exchange (NSE) from January 2013 to December 2014. 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 Meryl Lynch Method of data adjustment was used in adjusting the beta. 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. This in effect, invalidates the prediction of the CAPM as far as the banking sector of Nigerian Stock Exchange is concerned.

Since it is obvious from the results above that the CAPM did not guide share price movement in the Nigerian banking sector stocks, this study recommends that a model which will recognize to a large extent the movement of stocks prices in tandem with the general market mood be adopted. Secondly, in view of the manipulations reported in the past, this study recommends that the regulatory authorities in the stock market should maintain zero tolerance stand on the manipulation of share prices by some privileged and unscrupulous investors so as to maintain an efficient market.

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REGINALD MADUKA, CHINWEZE:
He was born in Anambra State, Nigeria.
He has B.Com(Hons) Accounting , Panjab University, Chandigarh, India, MBA (Accounting) from Imo State University, Owerri, Imo State, Nigeria. He is currently, a doctoral student at Imo State University, Nigeria.

Appendix

Table A1: First Bank of Nigeria (FBN) Stock Prices and ASI

Year 2013	Avg. Stock prices	Year 2014	Avg. Stock Prices	NSE ASI (Y)
Jan	21.10	Jan	31.2	3733.12pts
Feb	23.14	Feb	33.5	4781.22
Mar	19.16	Mar	30.01	6738.11
Apr	17.20	Apr	29.11	8324.11
May	22.00	May	27.01	3782.18
Jun	25.18	Jun	30.33	7543.72
Jul	24.13	Jul	33	7425.18
Aug	24.12	Aug	35	6628.13
Sept	26.01	Sept	36.12	6338.11
Oct	27.09	Oct	38.19	4536.28
Nov	29.10	Nov	38.41	8463.99
Dec	28.06	Dec	38.30	40000

NSE data sheet, 2015.
Adjusted beta= 1.18961
Actual Returns = $^{dt+pt-pt-1}/_{pt-1}$ = 0.89
CAPM = 0.332
CAPM – Actual Returns = -0.558
NOTE: The rest of the Banks adjusted beta, actual returns and CAPM results were estimated in similar manner.

Table A2: Treasury Bill and NSE ASI for the period.

Year	Treasury Bill Amount (N)	Annual NSE All-Share Index (points)
2013	3329072.1	40,000
2014	44, 550, 000, 000	3,4,657.15

Table A3: Beta Estimation of the Listed Equities

S/N	Stock	2013 Estimated Beta	2013 Adjusted Beta	2014 Estimated Beta	2014 Adjusted Beta
1	ACCESS	1.401958	1.268	1.2337	1.1541
2	DIAMOND	1.634970	1.422	1.8665	1.5829
3	ECOBANK	0.138387	0.423	1.8455	1.5695
4	FBN	1.282686	1.18961	1.0355	1.0201
5	FCMB	1.077025	1.0536	1.943	1.6298
6	Fidelity	1.144366	1.094	1.722	1.4837
7	GTB	1.185127	1.1273	1.077	1.0516
8	IBTC	1.433214	1.2881	1.6643	1.4422
9	UBA	1.528682	1.3551	1.5325	1.3568
10	UBN	1.231255	1.1541	1.91228	1.611
11	WEMA	0.659794	0.7722	1.83221	1.5561
12	ZENITH	1.544000	1.3645	1.322	1.216
13	SKYE BANK	1.558750	1.3752	1.1223	1.082
14	STERLING	1.119781	1.0804	1.5642	1.3780
15	UNITY	1.619625	1.4154	1.6233	1.4176

Source: Author's Computation (2015)