Systemic and Unsystemic Risks of Equities Listed in the Brewery Sector of the Nigerian Stock Exchange

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Abstract: This study addresses a very important topic in corporate finance that is not well treated in many developing stock markets with particular reference to Nigeria. Beta is a major component of the Capital Asset Pricing Model (CAPM) used in the determination of the required rate of return on equity but a very high percentage of the documented works done in this area have been out mostly in developed economies cum stock markets of America, Europe and Asia. However, since we have need for stock market, there is also need to estimate equity betas which will be used to determine the required rate of return on equities traded in our markets in order to guide investors in making investment decisions. Based on this need we calculated the (historical) betas of the listed stocks in the brewery sector of the Nigerian Stock Exchange from 2000-2012, a 13 years period. From the estimation of beta for the listed stocks, it was discovered that on the average, Guinness has the highest beta risk content of 11.05% closely followed by Nigerian brewery with 10.39% while International brewery has the highest alpha risk content of 96.63% closely followed by Jos International brewery with 90.38% in the brewery sector of the Nigerian Stock Exchange (NSE). On the average, the systematic risk content in the brewery sector stocks is <4%. Therefore, the bulk of the risk in this sector is constituted by unsystematic idiosyncratic non-market determined specific diversifiable risk.

Key words: Equity beta, total risk, alpha risk, beta risk, market risk, volatility level, brewery sector, systematic risk, unsystematic risk

INTRODUCTION

At the heart of CAPM is the fact that the returns on a financial asset increase with risk as it was first expounded by the Nobel prizewinner (Sharpe, 1964). He was supported in this opinion by Lintner (1965), Treynor (1965), Mossin (1966) and Black (1972). This financial theory dominated the academic literature and influenced greatly the practical world of finance and business from its inception up to the moment. It gives precise definition of risk and threw off-balance the work of Markowitz iable (alpha) and non-diversifiable (beta) risk, otherwise called non-market and market risks or unsystematic and systematic risks, respectively. Diversifiable or unsystematic risk represents the portion of an investment risk that can be eliminated by holding well diversified portfolio. This risk results from controllable but uncontrolled events that tend to be unique to an industry and/or a company such as management changes, labour changes, labour strikes, lawsuits and regulatory actions. Non-diversifiable or systematic risk is external to an industry and/or a company and is attributable to broad natural forces such as war inflation, political and sociological events. Such forces impact on all investments and are therefore not unique to a given company or sector. Therefore, the relationship between risk, diversifiable risk and is that total risk is equals to diversifiable risk plus non-diversifiable risk. Because any knowledgeable investor can eliminate diversifiable risk by holding a large number of well diversified portfolios of securities, the only relevant risk to be concerned about is non-diversifiable risk. Fischer and Jordan (2005) posit that studies have shown that by carefully selecting as few as fifteen securities for a portfolio, diversifiable risk can almost be entirely eliminated. But non-diversifiable risk is unavoidable and each security possesses its own level of non-diversifiable risk, measured with the financial metric called beta. Beta coefficient measures the sensitivity of each of the stock's returns to movements in the market's return. It shows how the price of a security responds to market forces. That is it measures the sensitivity of a stock to the market index. In effect the more responsive the price of a security is to changes in the market, the higher will be its beta. It enables us to state what premium should be paid on each of the firms shares by comparing each of them with that of the whole market portfolio. Beta is calculated by relating the returns on a security with the returns for the market. The beta for the over all market is

equa l-1.00 and other betas are viewed in relation to this value. Beta can be positive or negative. Investors will find beta helpful in assessing systematic risk and understanding the impact market movements can have on the return expected from a share of stock. For example, if the market is expected to provide a 10% rate of return over the next year, a stock having a beta of 1.50 would be expected to experienc an increase in return of approximately, 15 (1.50×10 = 15%) over the same period. This particular stock is much more volatile than the market as a whole. Decreases in market returns are translated into decreasing security returns and this is where the risk lies. For example if the market is expected to experience a negative return of 10% then the stock with a beta of 1.50 should experience a 15% decrease in its return (1.50×-10% = -15%). Stocks having betas of <1 will be less responsive to changing returns in the market and therefore are considered less risky.

In the field of finance there is widespread agreement that the Capital Asset Pricing Model (CAPM) is a good predictor of stock return. To work with CAPM there is need for beta coefficient, a major component of the Capital Asset Pricing Model (CAPM). While several empirical works had been done in several developed stock markets to capture beta value, there have been few such works in developing stock markets like Nigeria. Such studies have now become imperative given the developments in the Nigerian stock market. In Nigerian Stock Exchange (NSE), the appropriate beta coefficients of the brewery sector equity stocks have remained in doubt. As it were there seems to be no definite values for this important component of the CAPM. Besides and specifically, there is need to re-evaluate the risk level of the Nigerian brewery sector.

In emerging markets, measuring betas is more difficult and a complicated job because of insufficient data quite unlike the developed markets with abundant historical data. This lack of sufficient data on the stock market in emerging countries undermines beta computation and relevant formulas. And again, there might be no comparable local firms to firms that operate in the developed markets and this may cause unreliable betas estimates. The reliability and fitness of calculated betas are relevant to the valuation and investment of investors in emerging markets. Beta is useful in the. Determination of expected rate of return for a risky asset, via., $Ri = Rf + \beta$ (Rm-Rf), determination of cost of equity capital, via., $Ke = Rf + \beta$ (Rm-Rf), determination of portfolio risk via., Portfolio Beta $= \beta p = \Sigma Wi\ \beta i$; stock classification: stocks can be classified by beta into aggressive stocks = high beta stocks $= \beta = 1.79$-1.06, conservative stocks = average beta stocks $= \beta = 1.05$-0.93, defensive stocks = low beta

stocks $= \beta = 0.92$-0.02. On this fourth application of beta, one can recall that the return on any security varies with the security's beta. Beta measures the sensitivity of a stock's return to changes in the return on the market or the index. That is beta measures the sensitivity of the underlying assets prospects and investor's assessment thereof to those of the economy as a whole. Beta indicates how a stock is expected to move, up or down, relative to the overall market. Usually a stock with a higher beta represents a more volatile and riskier investment.

In the light of the above problem and needs, the major objective of this study is to find out the appropriate beta coefficients for the equity stocks with particular reference to the brewery sector. In addressing this specific objective, the study seeks to answer this specific question: what are the appropriate beta values for the listed brewery sector stocks in Nigeria for the period 2000-2012? To hazard a guess, it is hereby proposed that the brewery sector stocks are volatile as their beta values are greater or <1. On the scope of the study, it is a well known fact that companies quoted on the Nigerian Stock Exchange are segregated into many sectors but the area of interest of this study is the brewery sector. The decision to research only on brewery sector stocks is informed by the fact that brewery sector is an active sector in the exchange. However, the findings and conclusions to be derived from this work were as related to the brewery sector stocks in Nigeria. The study covers the period of 13 years (2000-2012), comprising 156 months. The significance of study lies in the fact that the findings of the study would assist investors in the Nigerian Stock Exchange in their investment decisions. More importantly, it should be useful in guiding policy makers at the exchange to formulate policies on equity share price movements so as to restore investors confidence in the market. When the investors confidence is restored, trading activities can increase. Certainly with an increased trading volume at the exchange, the overall wealth of the society will appreciate. For an investor, it represents a pivotal area around which sensible investment and financing decisions revolve. The profitability of trading on financial instruments depends on proper reference points. Therefore when deciding on the investment structure of an investor, the findings from this study become helpful to the investor. When deciding on which stock to transact in order to have a justifiable reward the beta value is needful. This work will bring to light and remind potential investors the price movement status of the Nigerian brewery sector stocks. This knowledge will help them to make informed investment and financing decisions that can enhance their investment value which is a sure way to wealth creation and poverty

eradication. Undoubtedly, the study will provide a basis upon which other researchers in the capital market issues can explore other sectors of the market. One major limitation of this study is the unavailability of complete data for 2013. The inclusion of 2013 data would have made the work a more current study.

Finally, this study provides both internal and external investors, financial institutions, companies and government more evidence in establishing their policies in investments and in governance. It also provides readers with references and exhibits.

Literature review: From conceptual theories in financial markets, systematic risk relates to the overall risk of the whole market which cannot be avoided by diversification and is measured by a financial metric, beta. Unlevered beta measures how much systematic risk a firm has without debt, compared to the benchmark in the stock market. Equity beta covers systematic risk of a firm's equity while asset beta measures that risk which a firm's asset has. Several factors which can affect beta include but not limit to the volatility of expected return of a single stock or the volatility of the expected return of the entire stock market index. Therefore, the company performance or its management performance, the investor confidence and the economic expectation might influence beta values. For a typical company, its beta can be estimated by using a regression of a stock returns against an overall stock exchange index return. Return is the rate at which an investment generates cash flows above the purchase cost of the investment. Return on a typical investment consists of two components. The basic component is the periodic cash receipts (or income) from the investment either in the form of interest or dividends. The second component is the change in the price of the investment asset which can be positive (or capital gain) or negative (or capital loss). This element of return is the difference between the purchase price and the price at which the asset can be or was sold. The income from an investment sometimes consists of one or more cash payments paid at specified intervals of time. For example, interest payments on most bonds are paid semi-annually where as dividends on common stocks are usually paid annually but sometimes are paid quarterly or semiannually. The term, yield is often used in connection with this component of return. Yield refers to the income component in relation to the purchase price of a security. The conceptual statement for total return of an investment consists of the sum of two components, income and price change (Fischer and Jordan, 2005; Pandey, 2009; Fernandez *et al.*, 2010; Arnold, 2008; Berk and De Marzo, 2009; Brealey *et al.*, 1995; Copeland *et al.*, 2005; Damodaran, 2001; Howells and Bain, 2008; Pandian, 2005; Ross *et al.*,

1996). Therefore, the return across time or from different securities can be measured and compared using the total return concept. The total return for a given holding period relates all the cash flows received by an investor during any designated time period to the amount of money invested in the asset. It is defined as total return equals to cash payments received plus price change over the period divide by purchase price of the asset. That is total return (R_i):

$$(R_i) = (D_t + P_t - P_{t-1})/P_{t-1}$$

Fernandez (2009a) computed Historical betas of AT and T, Boeing and Coca-Cola during the 2 months period of December 2001 and January 2002 with respect to the S and P 500. Each day, betas were calculated using 5 years of monthly data that is on December 18, 2001, the beta is calculated by running a regression of the 60 monthly returns of the company on the 60 monthly returns of the S and P 500. The returns of each month are calculated on the 18th of the month. The monthly return of December 18, 2001 = (total return December 18, 2001/total return November 18, 2001)-1.

Pablo Fernandez also stated that industry betas are very unstable. And that a portfolio beta can be calculated by taking market capitalization of each stock in the portfolio and then, average beta of each company security (Blitz *et al.*, 2012). Cont (2010) Fama and French (2004, 2006), Fernandez (2008), Rogers and Securato (2007). Fernandez and Bermejo (2009) using the return of the S and P 500 as market return, computed the correlations of the annual stock returns (1989-2008) of the Dow Jones companies and discovered on average that the composite stock market with a beta that is equal to one does better than calculated betas. They also discovered that the adjusted betas, i.e., 0.67 (calculated beta)+0.33) have higher correlation than calculated betas but adjusted betas have lower correlation than beta that is equal to one. They carried the exercise with four calculated betas every year end versus S and P 500 using, monthly data of last 5 years monthly data of last 2 years weekly data of last 5 years daily data of last 5 years and found similar results with the four betas. Despite this results, Fernandez (2009b) reports that 97.3% of the professors that justify the betas use regressions, webs, databases, textbooks or paper while only 0.9% of the professors justified the beta using exclusively personal judgment (named qualitative betas, common sense betas, intuitive betas, logical magnitude betas and own judgment betas by different professors).

The Capital Assets Pricing Model (CAPM): 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:

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

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

The model submits that only risk which cannot be diversified away, i.e., systemic risk 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 = -ve alpha, the security is overpriced. The CAPM provides a framework for valuation of securities.

Akintola-Bello (2004) used 96 months of security returns from Jan 1992 to December 1999 to estimate the betas for 173 firms quoted on the Nigerian stock exchange. He used growth rates in the NSE All-share index as the proxy for the market rate of return. 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 of a security is likely to be closer to 1 than the sample estimate. To correct for this bias, Merrill Lynch developed an adjustment technique. After using the ordinary least squares to gain a preliminary estimate of beta, using 60 monthly returns, the beta is adjusted as follows:

$$\text{Adjusted Beta} = 2/3 \text{ (Computed Sample Beta)} + 1/3(1) = 0.67(\text{Raw beta}) + 0.33(1)$$

The formula pushes high betas down toward 1.0 and low betas up toward 1.0. The raw betas computed are adjusted to remove individual securities bias.

Therefore, the conventional approach for estimating betas used by most investment firms, analysts and services is to use historical market data for firms that have been quoted for a long period. One can estimate returns that an investor would have made on their investments in intervals (such as a week a month) over that period. These returns can then be related to a proxy for the market portfolio to get a beta in the CAPM.

The beta of the overall stock market is +1.0 and every other stock beta is viewed in relation to this value, +1.0. A stock with beta of exactly one will on the average move by just 1% for every one percent movement by the market. A stock with a beta of 1.5 tends to be 50% more volatile than the average stock market index while that with a beta of 0.5 is half as volatile. If a stock with a beta rating of 1 moves 10% another stock with a beta equal to 2 can be expected to move twice as much (i.e., 20%). The beta usually used in stocks classification is the adjusted stock beta (Akintola-Bello, 2004).

When the stock market is declining, a stock with a beta rating of <1 is preferred. The reason is that such a stock is expected to decline less than the market. Conversely in a rising market such a stock will underperform compared to the overall market. When the overall market is rising, a stock with a high beta is expected to out-perform the market. An investor's objective during the stock selection process is to identify stocks that will rise faster than the average stock during a bull market, decline less than the average stock during a bear market. Huy (2013) captures the views of Sharpe (1964) and Black (1972) that the expected stock return is linearly proportional to its market beta and affirms that certainly, beta as a market risk measure has certain

influence on expected stock returns. He also reported that Fama and French (2004) also indicated in the three factor model that "value" and "size" are significant components which can affect stock returns. They also mentioned that a stock's return not only depends on a market beta but also on market capitalization beta. The market beta is used in the three factor model, developed by Fama and French (2006) which is the successor to the CAPM model by Sharpe.

Estimation of beta coefficient (β): The conventional approach for estimating betas as used by Value Line Investment Services Merrill Lynch (a US investment firm) and the London Business School Risk Management Service is to relate historical returns on an investment to a proxy for the market portfolio returns, using the ordinary least square techniques to get a beta. Also, according to Fischer and Jordan (2005), the beta coefficient is computed for equity using ordinary least square techniques. It is generally accepted that due to some statistical factors such as error in capturing the data and early approximations, the estimated betas using the regression analysis are not unbiased estimates of the underlying beta of a security. To correct for this bias, Merrill Lynch developed the technique which was also adopted by Akintola-Bello (2004). The technique is that after using the ordinary least squares to gain a preliminary estimate of beta, using 96 monthly returns, they adjust the beta using Adjusted beta = Raw beta (0.67)+0.33. In order to correct the bias in estimating beta, the above formula pushes high betas down to 1.0 and low betas up toward 1.0 and generate a better estimates of betas values.

Grinblatt and Sheridan (1998) state that in practice with historical return data the beta value is the ratio of covariance of the financial asset returns and the market returns to variance of the market return (beta = Cov[Ri, Rm]/Variance of Market return). Here, the proxy for market return is the return of the S and P 500. Grinblatt and Sheridan (1998) agreed that there exist estimation errors in computing beta value and support the idea of correcting the errors by adjusting the estimated beta value using the Bloomberg adjustment formula which states that Adjusted beta = 0.66 (Unadjusted beta)+0.34. Grinblatt and Sheridan (1998) state that analysts should avoid using daily returns and instead estimate betas with weekly or monthly returns where the effect of delayed or lagging reaction to market movements tends to be less severe.

Black (1972) shows how the CAPM changes when there is no risk-free asset or investors face restrictions on or extra cost of borrowing. Black (1993) estimating the relationship between beta and return on US shares, 1926-1991 established poor relationship after 1965.

On the assessment of risk Blume (1971) found out that betas change over time. Blume (1975) on his study on betas and their regression tendencies established that betas tend to 1 over time. On short term stationarity of beta coefficients Levy (1971) confirms that betas change over time. Grinblatt and Sheridan (1998) regressed 17 quarterly (last quarter of 1991-1995) historical returns for Dell Computer and the S and P 500 and obtained a beta value of 1.02.

MATERIALS AND METHODS

The study involved quoted firms on the Nigerian Stock Exchange (NSE). The NSE daily official list provided the stock prices we used to compute the capital gain of the relevant months and years. The NSE Daily Official List (DOL) provided the composite market index, the All-Share Index (ASI) we used to obtain rates of return on the entire market. Follow-up figures were computed by the researcher as shown below. The second component of return which is the change in the price of the investment asset which can be positive (or capital gain) or negative (or capital loss) is used. This element of return is the difference between the monthly average market price of the stock at the beginning of each month and the monthly average market price at the end of the month. The average return for each year both for the market and the stocks were obtained from the geometric mean of the 12-monthly returns for each year. The stocks betas were obtained using the linear regression model. In this study, we will use 156 months of each security's returns from January 2000-December 2012-estimate betas for the firms quoted on the Nigerian Stock Exchange. The proxy for the market portfolio is therefore the NSE All-Share Index (ASI) which encompass the total market value of quoted equity stocks.

Estimation market return (Rm): The NSE All-Share-Index (ASI) 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.

Estimation of rates of return of an asset (Ri): Usually, the total rate of return on each share is obtained by computing the relative values of prices between an holding period (monthly) plus dividend as exemplified in Akintola-Bello (2005), Pandian (2001). 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 immediate preceding period t-1

However, in this study, only the monthly capital gains were used as a proxy for rates of return to compute the beta in order to compare like terms with like terms. That is since market return does not include dividend in its return, then return from equity should be determined without the dividend element in order to place the two items on the same basis for reasonable comparison. The 12 monthly returns for each share were chain linked to obtain the annual return for stock. Chain link simply means finding the geometric mean of the 12 monthly returns.

Geometric mean: According to Watsham and Parramore (2007) 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. To measure the annual growth rate over n years, the appropriate model for geometric mean is as follows:

$$GM = (1+g_1)(1+g_2)(1+g_3)\ 1+gn)^{1/n}-1$$

where, g is the periodic growth rates expressed in decimals. The growth rate in earnings is computed using the geometric mean of the respective year's earnings growth rates.

Population and sample: In any study, it is important to determine the group of persons or things to study (Freund and Williams, 1979). In line with this thought, the population of this study is all quoted companies in Nigerian Stock market. The sample of study is all the quoted brewery sector firms on the Nigerian Stock Exchange.

RESULTS AND DISCUSSION

Listed in Table 1 are the total risks for the brewery sector stocks as computed by the researcher from 2000-2012.

The total risk of an asset is the sum of the diversifiable unsystematic risk (alpha risk) and the non-diversifiable systematic risk (beta risk). Table 1 above presents a measure of how much each of these companies returns in the past has deviated from the average. While the sectoral average total risk is 9.52 and the market risk is 6.19, between the years 2000-2012, the 13 years average total risk of International brewery at 19.72 is the highest in the sector followed by Champion with 13.70. The Golden Guinea and Premier brewery had been inactive for a very long time as can be seen from Table 1. Guinness and Nigerian brewery were very active on the trading floor of the exchange. Both constitute the most performing stocks in the sector which maintain steady presence in the market with average total risks of 9.05 and 9.39, respectively which are higher than the market risk average. Based on the data in Table 1, International brewery had the highest volatility within the period under study.

The beta for the overall market is 1 and other betas are viewed in relation to this value. Asset that is riskier than average will have beta that exceed 1. The asset that is safer than average will have betas that are lower than one. The riskless asset will have a beta of 0. Listed in Table 2 are the betas for the brewery stocks as reported from the research. Each stock beta changes value from one period to another. Investors will find the betas helpful in assessing systematic risk and understanding the impact market movements can have on the return expected from a share of these stocks. For example, if the market is expected to provide a 10% rate of return over 2012, stocks such as Guinness and Nigerian Brewery with beta of 1.04 and 1.01 will appreciate by 10.4 and 10.1%, respectively. On the other hand, return from International brewery will appreciate by 4.5%, Jos International brewery by 2.6%, Golden Guinea by 0.4% while Champion and Premier breweries will depreciate by 0.3 and 1.7%, respectively. Conversely, if the market falls by 10%, the reverse will be the case in all these stocks.

Unsystematic risk is that portion of the total risk that is unique or peculiar to a firm or an industry, above and beyond that affecting securities markets in general. Factors such as management capability, consumer preferences, labour changes and labour strikes, lawsuits and regulatory actions can cause unsystematic variability of returns for a company stock. Because these factors affect one industry and/or one firm, they must be examined separately for each company. Table 3 shows the values of the type of risk (the unsystematic risk or idiosyncratic risk, unique or specific non-market risk) that can be reduced through diversification. This element of volatility in a share return is due to the particular circumstances of the individual firm. On the average, International brewery has the highest unsystematic risk of 19.26 followed by Champion brewery with 13.73, Jos International with 9.16. Guinness and Nigerian Brewery were almost operating at the same volatility level of slightly above 8%. Others can be seen in Table 3.

Table 1: Total risks of breweries stocks

Years	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Ave
Champion	0	0	48.66	15.85	45.44	7.57	7.81	11.03	0	1.14	4.40	15.14	21.10	13.70
G/Guinea	0	23.73	4.16	6.40	0	0	0	0	0	0	0	0	0	2.60
Guinness	12.89	7.20	9.92	14.77	11.49	10.13	13.49	4.28	5.27	8.14	4.88	7.86	7.31	9.05
Int = l Brew	3.09	19.66	10.06	8.02	3.04	1.08	1.33	124.01	51.83	10.10	17.07	2.91	4.13	19.72
Jos Int = l	1.86	8.84	16.12	12.15	5.30	0	2.48	30.55	20.69	3.03	2.29	2.75	16.40	9.42
Nig.Brew	4.63	8.24	16.02	11.92	20.43	11.39	9.75	5.37	6.34	7.91	7.06	6.05	6.93	9.39
Premier	9.66	18.00	1.16	0	3.46	0	0	0	0	0	0	1.23	2.27	2.75
Average	4.59	12.24	15.16	9.87	12.74	4.31	4.98	25.03	12.02	4.33	5.10	5.13	8.31	9.52
Market risk	3.82	5.36	4.02	5.64	7.68	4.48	5.33	4.87	8.19	11.22	5.34	4.60	3.73	6.19

Table 2: Betas of breweries stocks

Years	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Ave
Champion	0	0	-3.61	-0.72	4.08	-0.01	0.14	1.48	0	-0.02	-0.29	-0.83	-0.61	-0.03
G/Guinea	0	0.55	-0.14	0.09	0	0	0	0	0	0	0	0	0	0.04
Guinness	2.34	1.14	2.24	0.49	1.12	1.79	1.84	0.34	0.53	0.44	0.54	1.25	-0.56	1.04
Int = l Brew	0.26	0.57	0.07	0.21	0.14	0.02	0.03	-0.67	3.31	0.67	1.41	0.28	-0.41	0.45
Jos Int = l	0.33	0.30	0.72	-0.76	0.35	0	-0.40	1.12	1.24	0.03	-0.12	0.22	0.31	0.26
Nig.Brew	0.58	0.82	1.51	1.86	1.88	1.76	1.74	0.19	0.59	0.46	1.02	0.90	-0.20	1.01
Premier	-0.78	-1.19	0.08	0	-0.28	0	0	0	0	0	0	0	0	-0.17
Average	0.39	0.31	0.12	0.17	1.04	0.51	0.48	0.35	0.81	0.23	0.37	0.25	-0.20	0.37

Table 3: Alpha risks of breweries stocks

Years	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Ave
Champion	0	0	52.27	16.57	41.36	7.58	7.67	9.55	0	1.16	4.69	15.97	21.71	13.73
G/Guinea	0	23.18	4.30	6.31	0	0	0	0	0	0	0	0	0	2.60
Guinness	10.55	6.06	7.68	14.28	10.37	8.34	11.65	3.94	4.74	7.70	4.34	6.61	7.87	8.01
Int = l Brew	2.83	19.09	9.99	7.81	2.90	1.06	1.30	124.68	48.52	9.43	15.66	2.63	4.54	19.26
Jos Int = l	1.53	8.54	15.40	12.91	4.95	0	2.88	29.43	19.45	3.00	2.41	2.53	16.09	9.16
Nig.Brew	4.05	7.42	14.51	10.06	18.55	9.63	8.01	5.18	5.75	7.45	6.04	5.15	7.13	8.38
Premier	10.44	19.19	1.08	0	3.74	0	0	0	0	0	0	1.30	2.21	2.92
Average	4.20	11.93	15.03	9.71	11.70	3.80	4.50	24.68	11.21	4.11	4.73	4.88	8.51	9.15

Table 4: Percentages of beta risks of breweries stocks

Years	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Ave
Champion	0	0	-7.42	-4.54	8.98	-0.13	1.79	13.42	0	-1.75	-6.59	-5.48	-2.89	-0.36
G/Guinea	0	2.32	-3.37	1.41	0	0	0	0	0	0	0	0	0	0.03
Guinness	18.15	15.83	22.58	3.32	9.75	17.67	13.64	7.94	10.06	5.41	11.07	15.90	-7.66	11.05
Int = l Brew	8.41	2.90	0.70	2.62	4.61	1.85	2.26	-0.54	6.39	6.63	8.26	9.62	-9.93	3.37
Jos Int = l	17.74	3.39	4.47	-6.26	6.60	0	-16.13	3.67	5.99	0.99	-5.24	8.00	1.89	1.93
Nig.Brew	12.53	9.95	9.43	15.60	9.20	15.45	17.85	3.54	9.31	5.82	14.45	14.88	-2.89	10.39
Premier	-8.07	-6.61	6.90	0	-8.09	0	0	0	0	0	0	-5.69	2.64	-1.46
Average	6.97	3.97	4.75	1.74	4.44	4.98	2.77	4.00	4.53	2.44	3.13	5.32	-2.69	3.57

Computed from the monthly rates of return from the subject firms

The average percentage of beta risk in brewery sector stocks is 3.57% while Champion, Golden Guinea, Guinness, International brewery, Jos International brewery, Nigerian brewery and Premier recorded average of -0.36, 0.03, 11.05, 3.37, 1.93, 10.39 and -1.46%, respectively. On the average, Guinness has the highest percentage of beta risk content in this sector hence it is the riskiest stock in terms of beta or systematic non-diversifiable risk in the brewery sector of the Nigerian Stock Exchange (NSE). The position of other stocks on this scale of measure can be observed in Table 4.

The average percentage of alpha risk in brewery sector stocks is 73.36% while stocks like International and Jos International recorded average of above 90%, Guinness, Nigerian Brewery recorded above 80% unsystematic risk content, Champion brewery has 77.28 % unsystematic risk while Golden Guinea and Premier, the major two dormant stocks recorded 23.05 and 47.61% respectively. On the average, International brewery has the highest percentage of alpha risk content in this sector; hence, it is the riskiest stock in terms of alpha or unsystematic diversifiable risk in the brewery sector of the Nigerian Stock Exchange (NSE). Table 5 above shows the position of all the stocks on this index of measurement.

The average return in terms of capital gains yield of the brewery sector stocks is 13.99% accounted by all the stocks except Golden Guinea as can be seen in Table 6

Table 5: Percentages of alpha risks of breweries stocks

Years	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Ave
Champion	0	0	107.42	104.54	91.02	100.13	98.21	86.58	0	101.75	106.59	105.48	102.89	77.28
G/Guinea	0	97.68	103.37	98.59	0	0	0	0	0	0	0	0	0	23.05
Guinness	81.85	84.17	77.42	96.68	90.25	82.33	86.36	92.06	89.94	94.59	88.93	84.10	107.66	88.95
Int = l Brew	91.59	97.10	99.30	97.38	95.39	98.15	97.74	100.54	93.61	93.37	91.74	90.38	109.93	96.63
Jos Int = l	82.26	96.61	95.53	106.26	93.40	0	116.13	96.33	94.01	99.01	105.24	92.00	98.11	90.38
Nig.Brew	87.47	90.05	90.57	84.40	90.80	84.55	82.15	96.46	90.69	94.18	85.55	85.12	102.89	89.61
Premier	108.07	106.61	93.10	0	108.09	0	0	0	0	0	0	105.69	97.36	47.61
Average	64.46	81.75	95.25	83.98	81.28	52.17	68.66	67.42	52.61	68.99	68.29	80.40	88.40	73.36

Table 6: Capital gain yields of breweries stocks

Years	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Ave
Champion	0	0	172.24	64.82	169.53	-94.79	28.67	38.32	0	-4.94	-34.05	63.75	0	12.81
G/Guinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guinness	38.78	22.90	24.73	63.78	26.80	-6.95	3.92	25.09	-42.66	44	35.38	20.950	0	19.75
Int = l Brew	-14.75	98.62	-5.57	-67.35	39.53	-3.39	-4.70	197.15	9.30	-96.32	112.19	-5.94	0	19.91
Jos Int = l	0	35.81	63.97	74.01	29.84	0	-12.54	43.78	13.67	-44.22	-15.71	-41.69	0	11.30
Nig.Brew	34.43	39.44	-18.98	75.57	-35.34	-4.92	-10.55	29.27	-33.46	43.69	38.62	24.07	0	13.99
Premier	-65.18	106.44	-4.18	0	-18.45	0	0	0	0	0	0	6.27	0	1.92
Average	-0.96	43.32	33.17	30.12	30.27	-15.72	0.69	47.66	-7.59	-8.26	19.49	9.63	0.00	13.99
Market return	37.91	38.28	7.07	51.82	17.13	4.06	31.43	53.05	-58.54	-36.64	17.18	-20.03	30.57	13.33

Computed from the monthly rates of return from the subject firms

Table 7: Volatility ranking of the Breweries stocks

Rank	2000	Beta	2001	Beta	2002	Beta	2003	Beta	2004	Beta	2005	Beta	2006	Beta
1	Guinness	2.34	Guinness	1.14	Guinness	2.24	NB	1.86	Champion	4.08	Guinness	1.79	Guinness	1.84
2	NB	0.58	NB	0.82	NB	1.51	Guinness	0.49	NB	1.88	NB	1.76	NB	1.74
3	JIB	0.33	IB	0.57	JIB	0.72	IB	0.21	Guinness	1.12	IB	0.02	Champion	0.14
4	IB	0.26	GG	0.55	Pr emier	0.08	GG	0.09	JIB	0.35	GG	0	IB	0.03
5	Champion	0	JIB	0.30	IB	0.07	Premier	0	IB	0.14	JIB	0	GG	0
6	G/Guinea	0	Champion	0	GG	-0.14	Champion	-0.72	GG	0	Premier	0	Premier	
7	Premier	-0.78	Premier	-1.19	Champion	-3.61	JIB	-0.76	Premier	-0.28	Champion	-0.01	JIB	-0.40
Ave		0.39		0.31		0.12		0.17		1.04		0.51		0.48

Rank	2007	Beta	2008	Beta	2009	Beta	2010	Beta	2011	Beta	2012	Beta
1	Champion	1.48	IB	3.31	IB	0.67	IB	1.41	Guinness	1.25	JIB	0.31
2	NB	1.12	JIB	1.24	NB	0.46	NB	1.02	NB	0.90	GG	0
3	Guinness	0.34	NB	0.59	Guinness	0.44	Guinness	0.54	IB	0.28	Premier	0
4	NB	0.19	Guinness	0.53	JIB	0.03	GG	0	JIB	0.22	NB	-0.20
5	GG	0	Champion	0	GG	0	Premier	0	GG	0	IB	-0.41
6	Premier	0	GG	0	Premier	0	JIB	-0.12	Premier	0	Guinness	-0.56
7	IB	-0.67	Premier	0	Champion	-0.02	Champion	-0.29	Champion	-0.83	Champion	-0.61
Ave		0.35		0.81		0.23		0.37		0.26	-0.21	

Compiled from Table 2 above

above. All the six stocks in the sector has positive capital gain yield. Surprisingly International brewery surpassed the giant breweries the Guinness and Nigerian Breweries in terms of capital gain yield. Though on yearly spread, Guinness and Nigerian breweries have the best capital gain spread in this sector as well as the most non-diversifiable risk in the brewery sector of the Nigerian Stock Exchange (NSE) within the period of study.

The market risk of a stock is measured by its beta coefficient which is an index of the stock relative volatility. Some benchmark values for beta are: $\beta = 0.5$: stock is only half as volatile or risky as the market stocks, $\beta = 1.0$: stock is as volatile or risky as the market stocks, $\beta = 2.0$: stock is twice as volatile or risky as the market stocks. From Table 7 show the volatility ranking of the stocks. Champion brewery with $\beta = 4.08$ and 1.48 led the chart of stocks whose volatility is more than that of the market in 2004 and 2007, followed by NB ($\beta = 1.88$ and 1.12), respectively. Guinness with $\beta = 2.34$ led in 2000-2002, 2005-2006 and 2011. Nigerian Brewery with

$\beta = 1.86$ led in 2003. In 2008-2010 International brewery with $\beta = 3.31$, 0.67, 1,41 had the highest systematic volatility level. In the final year 2012 Jos International brewery was the beta risk leading stock. These leaders were very aggressive stocks as very little upswing in the market return gives them more than double and triple appreciation in their returns as the case may be. The highest risky stock and the lowest risky stock in each year can be observed from the hierarchy in Table 7.

The yearly ranking of the stocks in order of the magnitude of the relative return (annual return per unit of beta) shows Champion occupying the first position in 2005, 2006 and 2009 with 9479, 204.79 and 247% per unit of systematic risk incurred. Golden Guinea had the highest relative return in the sector for 2003 with 720.22%. International brewery made it highest in 2001 and 2004, Jos International in 2002, 2008 and 2010, NB in 2007 and 2011, etc. While the sectoral average is 88.90% return per beta, Guinness has an average of 28.894% which is not quite an impressive positive figure. On the average, the

Table 8: Ranking of the stocks based on Relative Return (RR) = (Annual Return/Beta)

Rank	2000 Stocks	RR	2001 Stocks	RR	2002 Stocks	RR	2003 Stocks	RR	2004 Stocks	RR	2005 Stocks	RR	2006 Stocks	RR
1	Premier	83.56	IB	173.02	JIB	88.85	GG	720.22	IB	282.36	Champion	9479	Champion	204.79
2	NB	59.36	JIB	119.37	Guinness	11.04	Guinness	130.16	JIB	85.26	GG	0	JIB	31.33
3	Guinness	16.57	NB	48.10	NB	-12.57	NB	40.63	Premier	65.89	JIB	0	Guinness	2.13
4	Champion	0	Guinness	20.09	Champion	-47.71	Premier	0	Champion	41.55	Premier	0	GG	0
5	GG	0	GG	0	Premier	-52.25	Champion	-90.03	Guinness	23.93	NB	-2.80	Premier	0
6	JIB	0	JIB	0	IB	-79.57	JIB	-97.38	GG	0	Guinness	-3.88	NB	-6.06
7	IB	-56.73	Premier	-89.45	GG	-1230.29	IB	-320.71	NB	-18.80	IB	-169.50	IB	-156.67
Ave		14.68		38.73		-188.94		54.70		68.60		-11.63		10.79

Rank	2007 Stocks	RR	2008 Stocks	RR	2009 Stocks	RR	2010 Stocks	RR	2011 Stocks	RR	2012 Stocks	RR	Ave Stocks	RR
1	NB	154.05	JIB	11.02	Champion	247	JIB	130.92	NB	26.74	Champion	0	Champion	761.62
2	Guinness	73.79	IB	2.81	Guinness	100	Champion	117.41	Guinness	16.76	G/Guinea	0	Guinness	28.89
3	JIB	39.09	Champion	0	NB	94.98	IB	79.57	GG	0	Guinness	0	NB	28.06
4	Champion	25.89	GG	0	GG	0	Guinness	65.52	IB	-21.21	Int'l Brew	0	Premier	-6.29
5	GG	0	Premier	0	Premier	0	NB	37.86	Champion	-76.81	Jos Int'l	0	GG	-39.24
6	Premier	0	NB	-56.71	IB	-143.76	GG	0	Premier	-89.57	Nig.Brew	0	IB	-54.20
7	IB	-294.25	Guinness	-80.49	JIB	-1474	Premier	0	JIB	-189.50	Premier	0	JIB	-96.54
Ave		-0.20		-17.62		-167.97		61.61		-47.66		0		88.90

Table 9: Number of stocks in each volatility level

Years	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total	Ave
Very low	4	2	3	3	4	5	5	4	3	4	4	4	4	49	4
Low	-	-	-	1	-	-	-	-	-	2	-	-	1	4	1
Moderate low	2	3	1	2	-	-	-	1	2	1	1	2	2	17	-
Normal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moderate high	-	2	-	-	1	-	-	2	1	-	2	1	-	9	2
High	-	-	1	1	1	2	2	-	-	-	-	-	-	7	-
Very high	1	-	2	-	1	-	-	-	1	-	-	-	-	5	-
Total	7	7	7	7	7	7	7	7	7	7	7	7	7	91	7

Compiled from Table 1 above NB: $0<\beta<0.4$ = Very Low (VL), $0.4<\beta<0.5$ = Low (L), $0.5<\beta<1.0$ = Moderate Low (ML), $\beta = 1.0$ = Normal with the market, $1.0<\beta<1.5$ = Moderate high, $1.5<\beta<2.0$ = High, $\beta>2.0$ = Very high

Table 10: Percentage of stocks in each volatility level

Years	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total	Ave
Very low	57	28.5	43	43	57.1	71	71	57	43	57	57	57	57	54	57
Low	-	-	-	14	-	-	-	-	-	29	-	-	14	4	-14
Moderate low	29	43	14	29				14	29	14	14	29	29	19	-
Normal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moderate high	-	28.5	-	-	14.3	-	-	29	14	-	29	14	-	10	29
High	-	-	14	14	14.3	29	29	-	-	-	-	-	-	8	-
Very high	14	-	-	-	14.3	-	-	-	14	-	-	-	-	5	-
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Compiled from Table 1 above

sector outperformed the market which provides an average of 2.15% as against the sector average of 88.90% Table 8 shows the standing of all the stocks and that of the market on this scale of measure (Table 9).

In the brewery sector stocks a total of thirteen years were examined. Out of the 91 stock-period examined, 49 which represents 54% of the stocks for the period were of very low beta ($0<\beta<0.4$); 4 which represents 4% of the stocks for the period were of low beta ($0.4<\beta<0.5$); 17 which represents 19% of the stocks for the period were of moderate low beta ($0.5<\beta<1.0$); none reacts equally with the market movement ($\beta = 1.0$); 9 which represents 10% of the stocks for the period were of moderate high beta ($1.0<\beta<1.5$); 7 which represents 8% of the stocks for the

period were of high beta ($1.5<\beta<2.0$); 5 which represents 5% of the stocks for the period were of very high beta ($2.0<\beta$). On the average, 57, 14, 29% of the stocks are in the very low, moderate low, moderate high beta respectively as can be seen from Table 10.

From Table 11 it can be seen how the stocks fared in terms of value of beta below zero, equal to zero, between zero and one, equal to one and above one. We note that 19 firms in the sector sample has beta values higher ($>$) 1.

There are 72 firms in the sector sample with beta values less than ($<$) 1. Eighteen firms in the sector sample have beta values less ($<$) 0. And none has beta value equal to 1. On the whole, we have 68 volatile stocks during the 3 years period of study, out of which 19

Table 11: Number and percentage (in parentheses) of stocks in each of the three classifications of volatility levels

Beta	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Ave
β<0	1	1	2	2	1	1	1	1		1	2	1	4	18
β = 0	2	1		1	1	3	2	2	3	2	2	2	2	23
0<β<1	3	4	3	3	2	1	2	2	2	4	1	3	1	31
ß =1														
ß>1	1	1	2	1	3	2	2	2	2		2	1		19
Total	7	7	7	7	7	7	7	7	7	7	7	7	7	91

Compiled from Table 7 above

are aggressive stocks, 18 defensive stocks, 31 moderate volatile stocks and no average stock. Dormant stocks constitute 23 out of the 91 stocks which represents 25% of the whole lot for the study period. Therefore in essence within the study period, none out of the stocks moves in tandem with the movement of the market.

CONCLUSION

On the average, Guinness has the highest beta risk content of 11.05% closely followed by Nigerian brewery with 10.39% in this sector; hence Guinness it is the riskiest stock in terms of beta or systematic non-diversifiable risk in the brewery sector of the Nigerian Stock Exchange (NSE). On the average, International brewery has the highest alpha or unsystematic diversifiable risk content of 96.63% closely followed by Jos International brewery with 90.38% in the brewery sector of the Nigerian Stock Exchange (NSE). From the estimation of beta for the listed stocks, it was discovered that the beta content of the entire sector ranges between 11.05 and 0.03% which provided an average beta content of 3.57% for the sector. The alpha content of the entire sector ranges between 96.63 and 23.05% which provided an average alpha content of 73.36% for the sector. On the average, the systematic risk content in the brewery sector stocks is <4%. Therefore, the bulk of the risk in this sector is constituted by unsystematic idiosyncratic non-market determined specific diversifiable risk. Hence, some corrective measures have to be embarked upon in order to reduce noise in the rates of return of these stocks.

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