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Risk-Return Relationship in Nigerian Capital Market: Evidence from the Agricultural/Agro-Allied Sector (2000-2009)

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Abstract
The purpose of this study is to ascertain from empirical data the risk-return relationship that exist in the Agricultural/Agro-Allied sector of the Nigerian Stock Exchange(NSE). To achieve the objective, the researcher collected the daily equity prices of the stocks from the NSE Daily Official List from which capital gain yields of various months of each year under study were computed. Dividends were extracted from the companies' annual reports and accounts of each year under study from which dividend yields were computed. The standard deviation is the model used to determine the risk, while geometric mean was used to determine returns. The findings of the study established that on the average, of the five stocks that made the Agricultural/Agro-Allied sector, Afprint, Livestock Feeds, Presco, Okomu Oil Palm, and Okitipupa Oil Palm have beta of 1.23, 0.85, 0.69, 0.64, and 0.03 respectively. Okitipupa, Afprint and Okomu have strong positive risk-return relationship of 0.88, 0.80 and 0.74 with r^2 of 77.89, 64.65 and 55.09 percent respectively. The proportions of beta in the entire risk profile of the stocks were 5.76 percent in Afprint, 4.42 percent in Livestock Feeds, 3.63 percent in Okomu, and 6.21 percent in Presco. On the average, less than 10% of the total risk in an average common stock in the Agricultural/Agro-Allied sector is systematic risk. The unsystematic risk accounted for between 93.79 and 96.37 percent of the total risk. It was also established that the returns from Afprint were substantially attached to market return seconded by Livestock Feeds. This fact is also reflected in the distribution of beta coefficient in Afprint and Livestock Feeds.

1. Introduction

According to Bernstein(2002) the history of stock and bond markets shows that risk and reward are inextricably intertwined. He submits that investors should not expect high returns without high risk, and should also not expect safety without correspondingly low returns. He goes further to state that the general investing public, or non-professional investors, have a pronounced tendency to focus on an investment's return. While risk is not necessarily ignored, it certainly seems to play second fiddle to return in most individual investors' decision-making processes. According to Mullen and Roth(1991:191), "risk is the existence of states beyond the decision maker's control that affect the outcome of his or her choices. The degree of risk is a function of the size of the potential loss and the probability of that loss". For decision makers, the notion of risk is closely associated with the concept of return, and variations around a return. When considering risk, a decision is seen as a joint function of the expected value (or mean) and the riskiness (the variance) of the probability distribution over outcomes conditional on choice of a particular alternative (March, 1994:7). It is quite obvious from the above statements that any investment venture contains an element of risk. Risk is the possibility of the expected return not being realized. That is the possibility that the actual return from an investment will fall below the expected return. The greater the magnitude of deviation below the expected returns the greater the risk of the investment. Whereas risk is a situation where investor has a probability knowledge of the outcome of return on investment, uncertainty is a situation in which one has no knowledge at all (zero probability) of the future outcome of the return on investment. A situation where investor can predict the future outcome with 100 percent assurance is called certainty. Since no one has perfect knowledge of the future, investors attempt to capture uncertainties in the future through risk specification. Investors need to be quite sure of what risks they are taking. What risks are associated with each investment option? They should also know how to forecast and evaluate risk exposure. Risk Hedgers take position to reduce exposure to risk while speculators accept high risk exposure for the benefit of higher returns. However, the thought of risk gives investors sleepless nights but risk is something we encounter every day. Even crossing a busy street involves some risk. With investments, balancing risk and return can be a tricky operation. All investors want to maximize their return, while minimizing risk. Putting hard earned Naira on the line can be downright frightening. Some investments are certainly more "risky" than others, but no investment is risk free. Trying to avoid risk by not investing at all can be the riskiest move of all. That would be like keeping idle cash which is barren of income generation. In investing, just like

crossing the street with heavy traffic, one need to carefully consider the situation, accept a comfortable level of risk, and proceed to the destination. From the foregoing, it can be seen that risk can never be eliminated, but it can be managed.

On the other hand return is a percentage measure of investment gain or loss relative to the amount invested. For example, if you buy stock for N20,000 and sell it for N22,500, your return is a N2,500 gain. Or, if you buy stock for N20,000 and sell it for N19,500, your return is a N500 loss. Of course, you don't have to sell to figure return on the investments in your portfolio. You simply subtract what you paid from their current value to get a sense of where you stand. Long-term investors are interested in total return, which is the amount your investment increases or decreases in value, plus any income you received. Using the same example, if you sold a stock investment for a N2,500 gain after you had collected N150 in dividends, your total return would be N2,650. If you want to compare total return on two or more investments that you bought at different prices, you need to figure percent return. You do that by dividing the total return by your purchase price. For example, a N2,650 total return on an investment of N20,000 is 0.1325, or a 13.25% return. In contrast, a N2,650 total return on an investment of N30,000 is an 8.84% return. So while each investment has increased your wealth by the same amount, the performance of the first is stronger than the performance of the second.

The risk-return relationship is a fundamental concept in not only financial analysis, but in every aspect of life. If decisions are to lead to benefit maximization, it is necessary that individuals and institutions consider the combined influence on expected (future) return or benefit as well as on risk and cost. Understanding the relationship between risk and return is essential to understanding why people make some of the investment decisions they do. First is the principle that risk and return are directly related. The greater the risk that an investment may lose money the greater its potential for providing a substantial return. By the same token, the smaller the risk an investment poses, the smaller the potential return it will provide. For example, a start-up business could become bankrupt, or it could become a multimillion-Naira company. If one invests in the stock of this company, he could lose everything or make a fortune. In contrast, a blue chip company is less likely to go bankrupt, but the investor is also less likely to get rich by buying stock in a company with millions of shareholders. The second principle is that if you can get a better-than-average return on an investment with less risk, you may be willing to sacrifice potentially greater return to avoid greater risk. That is sometimes the case when interest rates go up. Investors pull their money out of stocks, which are more risky, and put it in bonds, which are less risky, because they are not giving up much in the way of potential return and they are gaining more safety. The third principle is that you can balance risk and return in your overall portfolio by making investments along the spectrum of risk, from the most to the least.

However, most, if not all, investors are risk averse. To get them to take more risk, firms would have to offer higher expected returns. Conversely, if investors want higher expected returns, they have to be willing to take more risk. Most investors do not have a quantitative measure of how much risk that they want to take. Investors given a choice between two investments with the same expected returns but different variances will normally pick the one with the lower variance. In practice, the expected returns and variances are calculated using historical data and are used as proxies for future returns. In a bid to show investors how to find out the level of risk and return in financial asset investment, this study becomes necessary.

Therefore the problem on ground this study sets out to proffer solution is that people have being investing over the years, placing their money in various stocks without identifying the rate of return and risk on such stocks. Hence the study is an attempt to address the issue by examining the relationship that exists between risk and return with particular reference to the firms listed under the Agricultural/Agro-Allied sector of the Nigerian Stock Exchange (NSE). The study becomes imperative as the findings would guide investors in selecting equity stocks in the NSE especially now that there is great awareness on capital market investment in Nigeria.

Specifically, the study is set to find out (1)the actual return of each stock for the study period, (2)the total risk(σ), the systematic(β) and unsystematic(α) risks for the study period and classify the firms' stocks in order of volatility level(β), (3) the percentage of variation of the firms' stocks prices that can be explained by variation in the market index and the nature of the risk-return relationship.

The study covered a ten-year period, 2000-2009. This paper has five major sections. Section one introduced the motives that propelled the research while section two reviewed the literatures relevant to the work. Section three showcased the research methodology while section four presents the empirical results from the research. Section five simply concludes the paper.

2.0 Review of Related Literature

2.1The Concept of Return

Return is the rate at which an investment generates cash flows above the purchase cost of the investment. According to Fischer and Jordan (1995:67), the correct measure of total return on any security must incorporate both income and price change. The income is the periodic cash receipts from the investment either in the form of interest or dividends. 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. 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 price change of the investment asset over the holding period is the difference between the beginning (or purchase) price and the ending (or sales) price at which the asset can be sold. The price change can be either positive (capital gain) where sales price exceeds purchase price, or negative (capital loss) where purchase price exceeds sales price. Therefore the conceptual definition of total return of an investment across time or from different securities is that it is the sum of income and price change(+/-) and either component can be zero for a given security over any given time period. Also the return across time or from different securities can be measured and compared using the total return concept. And 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. Mathematically, Total Return (R_i) is defined thus $(D_t + P_t – P_{t-1})/P_{t-1.}$

Total return = $\frac{\text{Cash payments received + Price change over the holding period}}{\text{Purchase price of the asset}}$

Pandian(2005:149) states that the today's security return is (today's price – yesterday's price)/yesterday's price)x100 and today's market return is (today's index – yesterday's index)/yesterday's index)x100. Likely daily returns, weekly returns can be calculated by using this week's and last week's prices instead of today's and yesterday's prices in the above mentioned formula. Monthly returns also can be calculated. Nwude(2004) opines that the rate of return on investment could be defined as the benefit that accrues to the investor in excess of the total amount invested, expressed as a percentage of the total amount invested on the investment. Based on the above definitions of return, the return on equity is the sum of dividend yield and capital gain/loss yield(whether realized or unrealized).

Mean return can be obtained by Arithmetic Mean(AM) or Geometric Mean(GM). AM is a simple average of a number of returns calculated for a particular time as a measure of central tendency. GM is a compound average of a number of returns calculated for a particular time as a measure of cumulative rate of return over multiple periods. GM is used in investment to reflect the realized change in wealth over multiple periods. The GM model is $[(1+r_1)(1+r_2)(1+r_3)…….(1+r_n)]^{1/n}$ -1, and that of AM is $(\sum r)/n$.

2.2 The Concept of Risk

Risk is the probability that possible future outcome may deviate from the expected outcome. The greater the magnitude of deviation the greater the risk. The possibilities of the various possible future outcomes can be predicted with some degree of confidence from the past knowledge of the event. This view is supported by Samuelson (1937), the Nobel Laureate when he says that we have but one sample of history and one must start analyzing the past in order to understand the future. This calls for use of historical data to look into the future. Relative to return, risk is the possibility that realized returns will be less than the returns that were expected. The source of such risk is the failure of dividends or interest and for the asset price to materialize as expected.

Some schools of thought have defined risk as volatility. Thus the price of a stock which tends to rise or fall more than the average stock price is considered risky. They even propound a quantitative measure of this risk known as beta. This beta is as well called the systematic risk. The systematic risk (or beta) is that portion of the total risk caused by factors affecting all the securities in the market. The factors include among others, economic, political, sociological changes in the country involved. For example, nearly all the stocks on the New York Stock Exchange (NYSE) recorded declining prices after the September 11, 2001 terrorist attack. In a similar fashion to the NYSE index, Fischer and Jordan (2005) note that on the average, 50% of the variation in common stocks price can be explained by variation in the market index. In other words, about one-half of the total risk in an average common stock is systematic risk.

The portion of the total risk that is unique to a firm or industry as a result of factors such as management capability, consumer preferences, labour strikes etc is called the unsystematic risk (or alpha). Understanding the nature of risk is not adequate unless it is expressed in some quantitative terms. Expressing the risk of a stock in quantitative terms makes it comparable with other stocks. The statistical tool often used to measure and used as a proxy for risk is the

standard deviation. This measure of variability in return includes both systematic (β) and unsystematic (α) risks. The systematic (beta coefficient) and unsystematic (alpha coefficient) can be calculated from $\beta = (n\sum xy - \sum x\sum y)/(n\sum x^2 - (\sum x)^2)$ and $\alpha = (\sum y)/n - \beta(\sum x)/n$, where x represents market index, y represents the stock price and n represents the number of observations. When β=+1.00, it means that one percent change in market index return causes exactly one percent change in the stock return. It indicates that the stock moves in tandem with the market. When β=+0.5, it means that one percent change in market index return causes 0.5 percent change in the stock return. It indicates that the stock is less volatile compared to the market. β=+2.0 means that one percent change in market index return causes 1 percent change in the stock return. It indicates that the stock return is more volatile compared to the market. When there is a decline of 10% in the market return, the stock with a beta of +2.0 would give a negative return of 20%. The stock with more than 1 beta value is considered to be risky. Negative beta value indicates that the stock return moves in the opposite direction to the market return. A stock with a negative beta of -1 would provide a return of 10% if the market return declines by 10% and vice versa. Stocks with negative beta resist the decline in the market return.

While the slope of the characteristic line(where the stock return{Y} is plotted against the market return{X}) is called the beta, the intercept of the line is alpha(α), which is the distance between the point of intersection and the horizontal X axis. It indicates that the stock return is independent of the market return up to that level of intersection. A positive α value is a healthy sign as it means the stock would yield profitable return. The correlation coefficient(r) measures the nature and the extent of relationship between the stock market index return and the stock return in a particular period. The $r = (n\sum xy - \sum x\sum y)/\sqrt{(n\sum x^2 - (\sum x)^2).\sqrt{(n\sum y^2 - (\sum y)^2)}}$. The square of the r is the coefficient of determination (r^2) which gives the percentage of variation in the stock return explained by the variation in the market return.

The study of risk and return continues to be an area of vital importance for researchers. However, the theorizing and empirical findings in this area continue to present a series of agreements and disagreements. Different researchers have conceptualized the risk-return relationship as being positive, negative, or curvilinear. The risk-return relationship has been presented in the literature in two distinct ways. One is the discussion on whether the relationship between risk and return is positive, negative, or curvilinear (Fiegenbaum, Hart, & Schendel, 1996). The second involves empirical anomalies that researchers are confronted with when examining the numerous studies in this area (Gooding, Goel, & Wiseman, 1996; Wiseman & Catanach, 1997). There have been relatively few explanations that have satisfactorily reconciled these differences. The existing differences in theories and the contradictory empirical findings can be explained by suggesting that different groups of researchers may have addressed specific domains of the risk-return relationship. Within the confines of a particular domain in the risk-return relationship, each theoretical approach and its associated empirical findings may appear consistent. However, as different theoretical approaches are somewhat narrow, no single approach is possibly sufficient to explain the contradictions that arise when domains are enlarged, associated assumptions changed, or situational variables are introduced.

2.3 The relationship between risk and return

Positive Relationship: An important foundation of the risk-return relationship is the notion that managers are generally risk averse. This approach is well accepted in formalist theories of decision making that are based on notions of individual rationality and maximization of utility. Agency theory, a formalist theory, is based on assumptions of rational behavior and economic utilitarianism (Ross, 1973), and assumes a linear positive relationship between risk and return. Risk behavior has been associated with assumptions of rational behavior, outcome weighing, and utility maximization. Financial theory posits that risk averse behavior is manifest when low risk is associated with low return, as well as when high risk is rewarded by high return (Fisher & Hall, 1969). This risk averse outlook also assumes that for each strategic alternative, firms and managers will choose that alternative which maximizes utility (Cyert and March, 1963). Aaker and Jacobson (1987) found support for a positive association between performance and both systematic and unsystematic risk, when risk was defined using accounting data. A number of other studies have also found support for a positive risk-return relationship (Bettis, 1981; Tiegen and Brun, 1997).

Negative Relationship: It was, however, the work of Bowman (1980, 1982) and the 'Bowman's Paradox' which suggested that his findings were at considerable variance with classical finance theory. Bowman (1980) found a distinct and significant negative relationship between risk and return. Examining a large sample of firms from 85

industries, Bowman found a negative relationship between risk and return among firms that were performing well, as well as a negative return between risk and return for firms performing poorly. Bowman's (1980, 1982) interpretations of his findings were that managers may be risk seekers under certain circumstances. Well-managed firms, according to Bowman (1980,1982), appeared to be able to increase their returns and reduce risk simultaneously (suggesting an apparent paradox on account of the negative relationship), and in contradiction with the positive risk-return relationship postulated by the formal theorists. The paradox in the risk-return association, the negative relationship found by Bowman (1980, 1982), where there is one cluster of high risk and low return firms (the inferior performers), and another cluster of low risk and high return firms (the superior performers), was also supported by other researchers (Fiegenbaum & Thomas, 1986; Cool & Dierickx, 1987).

Curvilinear Relationship: A third body of research, using Kahneman and Tversky's (1979) prospect theory explanations, found a curvilinear relationship between risk and return. Prospect theory suggests that people outweigh outcomes that are probable compared with outcomes that are certain. As a consequence, people prefer sure gains to likely gains, and prefer likely losses to sure losses. The concept of a reference point is central to prospect theory explanations. Many researchers assume that a reference point is typically the industry average or the performance of referent other firms. Performing below or above, the reference point affects managers' assessment of risk and consequent risk taking. The major prediction of prospect theory is that managers are both risk seeking and risk averse, depending on whether managers consider themselves to be in the domain of (relative) gains or (relative) losses. A fundamental argument of prospect theory is that managers use reference points in evaluating risky choices, and adopt risk seeking behaviors when operating below the reference point, and risk averse behaviors when operating above the reference point (Kahneman & Tversky, 1979). There is also considerable research support for a curvilinear relationship (Chang & Thomas, 1989; Fiegenbaum & Thomas, 1988; Singh, 1986). Prospect theory explains how the same manager may exhibit different types of risky behaviors that are predicated by relative performance and other feedback. Fiegenbaum et al. (1996) have argued for a linkage between reference points and a firm's strategic realignment.

In addition to these three theoretical approaches -- positive, negative, and curvilinear, there are some intriguing anomalies and contradictions that are worth pointing out. Prospect theory suggests that managers adopt risk seeking behaviors when their expected outcomes from actions are below their reference point, and risk averse behavior when expected outcomes are above their reference point. There are, however, some empirical findings that are contrary to the predictions of prospect theory (Highouse & Yüce, 1996, Lopes, 1987, March, 1988, March and Shapira, 1987 and 1992, Markku and Jani, 2007). Studies in decision making have found that past success increases the willingness to take risks (Staw, 1981; Staw and Ross, 1980; Thaler & Johnson, 1990), or that past failures lead to rigidity and risk averse behavior (Staw and Dutton, 1981). There exists a range of risk-related behaviors to which there is no clear and composite theory or unifying explanation.

3. Research Methodology

The study explores the risk-return relationship of quoted firms in the Agricultural/Agro-Allied sector of the Nigerian stock exchange. The dependent variable is ***Rate of Return*** (denoted by Y) while the independent variable is ***Risk*** (denoted by X). The numerical values of the dependent and independent variables were computed for each of the years 2000-2009 using the model for computing each. Afterward, we compute the correlation coefficient between the two variables using the Pearson's(product moment) coefficient of correlation formula. Correlation coefficient is a measure of the degree of co-variability of the variables X and Y. Return is the measure of the gains or losses in an investment. The study involved quoted firms on the Nigerian stock exchange. The NSE daily official list provided the stock prices we used to compute the capital gain while the dividends used to compute the dividend yield were extracted from the firms' annual reports and accounts of the relevant years. Follow-up figures were computed by the researcher. The central bank of Nigeria statistical bulletins provided the rates of return on the FGN Treasury bills. The average for each year, made up of four quarters is adopted as the risk-free rate of return for each year. The yearly rate of return on common stock for each year is the Geometric mean of the capital gain yield for the twelve (12) months in each year multiplied by twelve plus the dividend yield for that year. That is, the model used to get the rate of return for each stock = $(Dt + P_t - P_{t-1})/ P_{t-1}$, where D/ P_{t-1} is the dividend yield for the year, $(P_t - P_{t-1})/ P_{t-1}$ is the capital gain yield for each month. Then the geometric mean of the monthly (January-December of each year) multiplied by the twelve months that make a year gives the total capital gain yield for the year.

It is common knowledge that the statistic familiar to most people in finding the average return is the arithmetic

average (that is, the sum of the values being considered divided by the total number of values) as rightly observed by Fischer and Jordan (2005:69). But the arithmetic average return is appropriate as a measure of the central tendency of a number of returns calculated for a short length of time and not for multiple periods. When percentage changes in value over time are involved, the arithmetic mean of these changes can be misleading. For example, suppose an investor purchased a stock in Year 1 for N10 and held it to rise to N40 by year-end. That is a 100% return for year 1. Thereafter the stock declined to N20 at the end of year 2 and the return for year 2 became -50%. The arithmetic average return at the end of the 2 years period will be 25%(i.e [100% + -50%]/2) while clearly there is no return at all at the end of the 2 years holding period. To obtain accurately the true rate of return over multiple periods, a geometric average, which measures compound, cumulative returns over time, is needed. The geometric average or mean is defined as the nth root of the product resulting from multiplying a series of return relatives together, and after the root less1. Mathematically stated, GM = $[(1+R1)(1+R2)(1+R3).....(1+Rn)]^{1/n} - 1$, where 1+Ri represents the return relatives, which is obtained by adding 1 to each of the total return expressed as a percentage. The n represents the number of periods. Return relatives are used in calculating the geometric average returns because negative total returns cannot be used in mathematics. Plugging the 2-year stock returns into the GM model, we obtain the true rate of return for the 2-year to be $[(1+1.00)(1+ - 0.50)]1/2 - 1 = [(2.00)(0.50)]^{1/2} - 1 = 1 - 1 = 0$. The risk for each year is obtained from the standard deviation of the monthly (January-December of each year) rates of return.

The model employed for undertaking an investigation into the nature of the relationship between risk and return in this sector is coefficient of correlation(r) and coefficient of determination (r^2). The NSE All-Share-Index was used to generate the market returns. Next we apply the ordinary least square formula on the stock returns and the market returns to derive estimates of the beta parameter, which denotes the level of systematic risk of each stock. That is, the beta coefficient was obtained from $\beta = [n\sum XY - \sum X\sum Y]/[n\sum X^2 - (\sum X)^2] = [n\sum RmRi - \sum Rm\sum Ri]/[n\sum Rm^2 - (\sum Rm)^2]$. The **coefficient of correlation(r) was obtained from r =** $[n\sum XY - \sum X\sum Y]/[n\sum X^2 - (\sum X)^2] = [n\sum RmRi - \sum Rm\sum Ri]/[n\sum Rm^2 - (\sum Rm)^2 \text{ x } n\sum Ri^2 - (\sum Ri)^2]^{1/2}$. We then resort to the use of descriptive statistics to interpret data gathered in order to comprehend the risk/return relationship involve in investing in the capital market, most especially our subject firms.

4.0 Data Presentation and Analysis

This section presents the computations made by the researcher from data collected. The data collected are the daily ordinary share prices of the subject-firms from the Nigerian Stock Exchange (NSE) Daily Official List (DOL) from January 2000 to December 2009, and the dividends paid during the year for each of the selected firms as shown in their annual reports. Other figures as presented were computed by the researcher.

Table 4.1: Risk-Return Data of the NSE

Market Data(NSE ASI)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Annual **GM** Return(Rm%)	37.91	38.28	7.07	51.82	17.13	4.06	31.43	53.05	-58.54	-36.64
Annual **AM** Return(Rm%)	38.72	39.74	7.94	53.48	20.33	5.16	32.87	54.27	-54.67	-30.07
Annual Ave Value Return(Rm%)	27.71	53.53	15.44	32.30	60.20	-7.30	21.63	72.29	8.32	-54.87
Annual Risk	3.81	5.36	4.02	5.64	7.68	4.48	5.33	4.87	8.19	11.22
Return per unit risk	9.72	7.14	1.76	9.19	2.21	0.89	5.92	10.89	-7.15	-3.38
Risk-free Return(Rf %)	12.00	12.95	18.88	15.02	14.21	7.00	8.80	6.91	8.58	6.05
Risk Premium(Rm – Rf)	25.91	25.33	-11.81	36.80	2.92	-2.94	22.63	46.14	-67.12	-42.69
Risk-Return r										-0.6819
Risk-Return r^2										0.4650

Source: Computed from the NSE DOL

The geometric mean rates of return from 2000 to 2009 of the Nigerian Stock Exchange(NSE) using the exchange All-Share Index(ASI) are shown in row 1 of table 4.1. The rates ranged from 53.05 percent in 2007 to -58.54 percent

in 2008. It would be recalled that the effect of the Global Financial Meltdown, which impacted negatively on many developed capital markets, was experienced in the Nigerian Stock Exchange as from end of first quarter of 2008(March 2008 precisely). That gave rise to the poorest performance of the market in that 2008. The NSE also recorded the highest negative annual rate of return in the same year as can be seen in row 1 of table 4.1. The annual risk of the NSE ranged between 3.81 in 2000 and 11.22 in 2009. The return per unit risk was highest in 2007 with 10.89 percent per unit of risk incurred. The risk premium was also highest in 2007. The year 2007 was the best year in the NSE performance in terms of return. However only 46.50 percent of the variations in the NSE return can be explained by variations in risk profile, while there exists an average negative relationship between risk and return in the NSE performance.

Table 4.2: Risk-Return Data of Afprint

1. Afprint	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Ave
Annual **GM** Return(Ri%)	-24.55	-44.26	-32.28	-25.32	17.31	-37.36	48.93	155.14	3.63	-112.75	-5.15
Annual Risk(%)	8.56	5.00	11.33	21.46	32.83	11.48	23.80	47.77	33.29	14.73	
Risk-free Return(Rf %)	12.00	12.95	18.88	15.02	14.21	7.00	8.80	6.91	8.58	6.05	
Risk Premium(Ri – Rf)	-36.55	-57.21	-51.16	-40.34	3.10	-44.36	40.13	148.23	-4.95	-118.80	

Source: Computed from the NSE DOL and Annual Reports of Afprint

The geometric mean rates of return from 2000 to 2009 of Afprint are shown in row 1 of table 4.2. The rates ranged from 155.14 percent in 2007 to as low as -112.75 percent in 2009 for the same reason as highlighted in the market return above. The annual risk of Afprint ranged from the lowest of 5.00 in 2001 to the highest of 47.77 in 2007. The risk premium was highest in 2007 and lowest in 2009.

Table 4.3: Risk-Return Data of **Livestock Feeds**

2. Livestock Feeds	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Ave
Annual **GM** Return(Ri%)	-14.57	-9.62	0	-19.65	0	0	-104.34	134.85	-36.66	-138.41	-18.84
Annual Risk(%)	1.68	2.06	0	4.12	0	0	14.21	38.66	24.59	21.95	
Risk-free Return(Rf %)	12.00	12.95	18.88	15.02	14.21	7.00	8.80	6.91	8.58	6.05	
Risk Premium(Ri – Rf)	-26.57	-22.57	-18.88	-34.67	-14.21	-7.00	-113.14	127.94	-45.24	-144.46	

Source: Computed from the NSE DOL and Annual Reports of Livestock Feeds

The annual rates of return of Livestock Feeds ranged from 134.85 percent in 2007 to as low as -138.41 percent in 2009 for the same reason as highlighted in the market return above. The annual risk of Livestock Feeds ranged from the lowest of 0.00 in 2002, 2004, 2005 to the highest of 38.66 in 2007. The risk premium was also highest in 2007 at 127.94 percent and lowest in 2009 at -144.46 percent.

Table 4.4: Risk-Return Data of Okitipupa Oil Palm

3. Okitipupa Oil Palm	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Ave
Annual **GM** Return(Ri%)	-15.14	-14.90	0	-7.61	6.17	28.73	6.54	98.58	107.67	-5.07	20.5
Annual Risk(%)	1.47	1.42	0	1.19	1.56	3.98	1.30	5.76	14.05	1.24	
Risk-free Return(Rf %)	12.00	12.95	18.88	15.02	14.21	7.00	8.80	6.91	8.58	6.05	
Risk Premium(Ri – Rf)	-27.14	-27.85	-18.88	-22.63	-8.04	21.73	-2.26	91.67	99.09	-11.12	

Source: Computed from the NSE DOL and Annual Reports of *Okitipupa Oil Palm*

The annual rates of return of Okitipupa Oil Palm ranged from 107.67 percent in 2008 to as low as -15.14 percent in 2000 for the same reason as highlighted in the market return above. The annual risk of Okitipupa Oil Palm ranged from the lowest of zero in 2002 to the highest of 14.05 in 2008. The risk premium was highest in 2008 at 99.09 percent and lowest in 2001 at -27.85 percent.

Table 4.5: Risk-Return Data of Okomu Oil Palm

4. Okomu Oil Palm	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Ave
Annual **GM** Return(Ri%)	44.67	-23.02	-26.19	46.94	46.04	19.18	73.99	11.58	-13.75	-34.02	14.54
Annual Risk(%)	13.75	4.55	6.38	19.51	18.37	6.46	11.74	14.46	10.66	2.37	
Risk-free Return(Rf %)	12.00	12.95	18.88	15.02	14.21	7.00	8.80	6.91	8.58	6.05	
Risk Premium(Ri – Rf)	32.67	-35.97	-45.07	31.92	31.83	12.18	65.19	4.67	-22.33	-40.07	

Source: Computed from the NSE DOL and Annual Reports of *Okomu Oil Palm*

The annual rates of return of Okomu Oil Palm ranged from 73.99 percent in 2006 to -34.02 percent in 2009 for the same reason as highlighted in the market return above. The annual risk of Okomu Oil Palm ranged from the lowest of 2.37 in 2009 to 19.51 in 2003. It had moderate risk profile and risk premium except in 2001-2002, 2008-2009 when it recorded negative risk premia of -35.97, -45.07, -22.33 and -40.07 percent respectively.

Table 4.6: Risk-Return Data of Presco

5. Presco	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Ave
Annual **GM** Return(Ri%)	-	-	-	85.94	-4.63	28.06	-10.31	21.17	-8.38	-72.52	3.93
Annual Risk(%)	-	-	-	13.35	14.71	8.42	5.57	9.39	23.58	22.19	
Risk-free Return(Rf %)	12.00	12.95	18.88	15.02	14.21	7.00	8.80	6.91	8.58	6.05	
Risk Premium(Ri – Rf)	-	-	-	70.92	-18.84	21.06	-19.11	14.26	-16.96	-78.57	

Source: Computed from the NSE DOL and Annual Reports of *Presco*

The annual rates of return of Presco ranged from the lowest of -72.52 percent in 2009 to the highest of 85.94 percent in 2003, the period it started newly. The annual risk of Presco ranged from the lowest of 5.57 in 2006 to 23.58 in 2008. Though with very low risk profile it had very poor risk premium except surprisingly in 2003, 2005, and 2007 when it recorded positive risk premia. The risk premium was interspersed with positive and negative values as can be seen in table 4.6 above.

Table 4.7: Relationship between Market Return and Stocks' Returns

Stocks	Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Period Average
1.Afprint	Total Risk (σ)	8.56	5.00	11.33	21.46	32.83	11.48	23.80	47.77	33.29	14.73	21.03
	Systemic Risk (β)	1.28	0.43	-0.26	0.93	2.32	0.73	-0.61	3.86	3.00	0.61	1.23
	Unsystemic Risk (α)	7.28	4.57	11.59	20.53	30.51	10.75	24.41	43.91	30.29	14.12	19.80
	βProportion(5.76%)	14.91	8.51	-2.27	4.32	7.07	6.38	-2.55	8.09	9.01	4.16	5.76
2.Livestock	Total Risk (σ)	1.68	2.06	0	4.12	0	0	14.21	38.66	24.59	21.95	10.73
	Systemic Risk (β)	0.03	0.07	0.00	0.26	0.00	0.00	0.95	2.94	2.63	1.64	0.85
	Unsystemic Risk (α)	1.65	1.99	0	3.86	0	0	13.26	35.72	21.96	20.31	9.88
	βproportion(4.42%)	1.77	3.50	0	6.37	0	0	6.70	7.62	10.71	7.48	4.42
3.Okitipupa	Total Risk (σ)	1.47	1.42	0	1.19	1.56	3.98	1.30	5.76	14.05	1.24	3.20
	Systemic Risk (β)	0.09	-0.02	0.00	-0.05	-0.11	-0.23	-0.08	-0.41	1.11	0.01	0.03
	Unsystemic Risk (α)	1.38	1.44	0	1.24	1.67	4.21	1.38	6.17	12.94	1.23	3.17
	βProportion(-1.75%)	6.22	-1.32	0	-4.27	-7.07	-5.86	-6.48	-7.04	7.87	0.46	-1.75
4.Okomu	Total Risk (σ)	13.75	4.55	6.38	19.51	18.37	6.46	11.74	14.46	10.66	2.37	10.83
	Systemic Risk (β)	1.16	-0.23	-0.81	1.97	0.94	0.37	1.18	1.60	0.23	0.03	0.64
	Unsystemic Risk (α)	12.59	4.78	7.19	17.54	17.43	6.09	10.56	12.86	10.43	2.34	10.19
	βProportion(3.63%)	8.44	-5.13	-12.76	10.09	5.14	5.77	10.08	11.05	2.14	1.45	3.63
5.Presco	Total Risk (σ)	-	-	-	13.35	14.71	8.42	5.57	9.39	23.58	22.19	13.89
	Systemic Risk (β)	-	-	-	0.49	0.08	1.28	0.67	0.26	0.65	1.43	0.69
	Unsystemic Risk (α)	-	-	-	12.86	14.63	7.14	4.90	9.13	22.93	20.76	13.20
	βProportion(6.21%)	-	-	-	3.69	0.54	15.15	12.11	2.76	2.76	6.46	6.21

Source: Computed from field study

The average beta coefficient which represents the systematic risk profile of each stock are 1.23, 0.85, 0.03, 0.64, and 0.69 for Afprint, Livestock Feeds, Okitipupa, Okomu and Presco respectively(table 4.7). This shows that of all the Agric/Agro-Allied stocks, Afprint was the most volatile followed by Livestock Feeds, Presco, and Okomu Oil Palm. Okitipupa Oil Palm was mainly driven by idiosyncratic risk. The proportion of beta in the entire risk profile of the stocks was 5.76 percent in Afprint, 4.42 percent in Livestock Feeds, 3.63 percent in Okomu, and 6.21 percent in Presco. The unsystematic risk accounted for between 93.79 and 96.37 percent of the total risk. From table 4.7 there is clear evidence that the returns from Afprint were substantially attached to market return seconded by Livestock Feeds. This fact is also reflected in the distribution of beta coefficient in Afprint and Livestock Feeds. In this respect, these two stocks were followed by Presco and Okomu in this order.

Table 4.8: Risk-Return Relationship between Stocks' Returns and Stocks' Risks

Stocks	Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1.Afprint	Return per unit Risk	-2.87	-8.85	-2.85	-1.18	0.53	-3.25	2.06	3.25	0.11	-7.65
	Correlation Coeff. (r)										0.8040
	Determination Coeff.(r^2)										0.6465
2.Livestock	Return per unit Risk	-8.67	-4.67	0	-4.77	0	0	-7.34	3.49	-1.49	-6.31
	Correlation Coeff. (r)										0.1918
	Determination Coeff.(r^2)										0.0368

3.Okitipupa	Return per unit Risk	-10.30	-10.49	0	-6.39	3.96	7.22	5.03	17.11	7.66	-4.09
	Correlation Coeff. (r)										0.8825
	Determination Coeff.(r^2)										0.7789
4.Okomu	Return per unit Risk	3.25	-5.06	-4.11	2.41	2.51	2.97	6.30	0.80	-1.29	-14.35
	Correlation Coeff. (r)										0.7422
	Determination Coeff.(r^2)										0.5509
5.Presco	Return per unit Risk	-	-	-	6.44	-0.31	3.33	-1.85	2.25	-0.36	-3.27
	Correlation Coeff. (r)	-	-	-							-0.4524
	Determination Coeff.(r^2)	-	-	-							0.2047

Source: Computed from field study

On the risk-return relationship between stocks' returns and stocks' risks, the return per unit risk was highest in Okomu in 2000 and 2006 with 3.25 and 6.30 percent per unit of risk incurred, Presco in 2003 with 6.44percent, Okitipupa in 2004, 2005, 2007 and 2008 with 3.96, 7.22, 17.11 and 7.66 percent respectively. Livestock Feeds produced negative return per risk throughout the period while other stocks were interspersed by positive and negative return per unit risk. An insignificant 2.05 percent of the variations in Presco return can be explained by variations in its risk profile, while there exists a marginal negative relationship between its risk and return relationship. A significant 77.89, 64.65 and 55.09 percent of the variations in Okitipupa, Afprint and Okomu returns respectively can be explained by variations in their risk profile with a very strong positive relationship between risk and return of 0.88, 0.80 and 0.74 in the stocks' performance.

Table 4.9:Classification of the Stocks based on Systematic(BetaValue)Risk Factor

	2000				2001				2002			
S/n	Stocks	Beta	Volatility status	%	Stocks	Beta	Volatility status	%	Stocks	Beta β	Volatility status	%
1	Afprint	1.28	Moderate high		Afprint	0.43	Low	25	Livestock	0	Neutral	
2	Okomu	1.16	Moderate high	50	Livestock	0.07	Insignificant		Okitipupa	0	Neutral	50
3	Okitipupa	0.09	Insignificant		Okitipupa	-0.02	Insignificant	50	Afprint	-0.26	**Very low**	25
4	Livestock	0.03	Insignificant	50	Okomu	-0.23	Very low	25	Okomu	-0.81	**Moderate low**	25
5	Presco	-	-		Presco	-	-		Presco	-		
				100				100				100

Source: **Computed from table 4.7**

	2003				2004				2005			
S/n	Stocks	Beta	Volatility status	%	Stocks	Beta	Volatility status	%	Stocks	Beta	Volatility status	%

1	Okomu	1.97	Moderate high	20	Afprint	2.32	High	20	Presco	1.28	Moderate high	20
2	Afprint	0.93	**Moderate low**	20	Okomu	0.94	**Moderate low**	20	Afprint	0.73	**Moderate low**	20
3	Presco	0.49	**Low**	20	Presco	0.08	Insignificant	20	Okomu	0.37	**Low**	20
4	Livestock	0.26	Very low	20	Livestock	0	Neutral	20	Livestock	0	Neutral	20
5	Okitipupa	-0.05	Insignificant	20	Okitipupa	-0.11	Very low	20	Okitipupa	-0.23	**Very low**	20
				100				100				100

Source: **Computed from table 4.7**

	2006				2007				2008			
S/n	Stocks	Beta	Volatility status	%	Stocks	Beta	Volatility status	%	Stocks	Beta	Volatility status	%
1	Okomu	1.18	Moderate high	20	Afprint	3.86	Very High		Afprint	3.00	Very high	
2	Livestock	0.95	**Moderate low**		Livestock	2.94	**High**	40	Livestock	2.63	**Very high**	40
3	Presco	0.67	**Moderate low**	40	Okomu	1.60	**Moderate high**	20	Okitipupa	1.11	**Moderate high**	20
4	Okitipupa	-0.08	Insignificant	20	Presco	0.26	Very low	20	Presco	0.65	Moderate low	20
5	Afprint	-0.61	**Moderate low**	20	Okitipupa	-0.41	Low	20	Okomu	0.23	**Very low**	20
				100				100				100

Source: **Computed from table 4.7**

	2009			
S/n	Stocks	Beta	Volatility status	%
1	Livestock	1.64	Moderate high	
2	Presco	1.43	Moderate high	40
3	Afprint	0.61	Moderate low	20
4	Okomu	0.03	Insignificant	
5	Okitipupa	0.01	Insignificant	40
				100

Source: **Computed from table 4.7**

In terms of stock classification in the order of systemic risk factor, Afprint was the most volatile stock in years 2000, 2003, 2004, 2007, 2008, and took second position in year 2005. Livestock was most volatile stock in 2009 and second in 2006-2008. Okitipupa showed up only in 2008 where it occupied third position in stock volatility. Okomu produced the highest beta value in 2006 but occupied second position in 2000, 2003, 2004, and third in 2007. Presco was first in 2005, second in 2009 and third in 2006. On the whole we have two moderate high positive volatile stock (Afprint 1.28, Okomu 1.16) in 2000, one (Okomu 1.97) in 2003, one (Presco 1.28) in 2005, one (Okomu 1.18) in 2006, and two (Livestock 1.64, Presco 1.43) in 2009. Afprint and Livestock presented very high volatility in 2007 and 2008. Other spaces were filled with a mixture of neutral, low, very low and insignificant volatility status. The volatility positions of the stocks for other years can be seen in table 4.9. On the whole, we have 3 very high, 3 high, 9 moderate high, 7 moderate low, 6 very low positive volatile stocks plus 3 neutral, 3 low, 7 moderate low, 10 insignificant volatile stocks**.**

5.0 Conclusions

The study was set out to find the (1) actual return of each stock for the study period, (2) the risk premium, (3) total risk(σ), (4) relationship between market return and each stock return, (5) risk-return relationship between each stock return and its risk profile, (6) proportion of systematic(β) and unsystematic(α) risks in the stocks risk profile in order to depict the percentage of variation of the firms' stocks prices that can be explained by variation in the market index, and (7) classification of the stocks in order of volatility level using the beta(β).

The findings from the study show that in terms of return all the stocks made negative return in 2000-2002 and 2009, except Okomu Oil that provided quite a significant figure of 44.67% in 2000, while such position held in the market return in 2008. Okomu was the most profitable stock in 2000, 2004, 2006, Presco in 2003, Afprint in 2007, Okitipupa in 2008, while Livestock was the worst stock in terms of profitability. Okomu provided highest positive risk premium in 2000, 2004, 2006, Presco in 2003, Afprint in 2007, Okitipupa in 2008. Almost all the stocks generated negative risk premium in all the years except in 2004, 2006, 2007 for Afprint, in only 2007 for Livestock, in 2005, 2007, 2008 for Okitipupa, in 2000, 2003-2007 for Okomu and in 2003, 2005, 2007 for Presco.

Afprint was the most risky stock from 2001-2008 while Okomu was in 2000, and Presco was in 2009. From the test of the relationship between markets return and each stock return, the most volatile stocks from 2000-2009 were Afprint in 2000, 2001, 2003, 2004, 2007, 2008, Livestock in 2009. Afprint was the most volatile stock for the period of study with an average beta of 1.23. The proportion of systemic risk was lowest in Okitipupa with -1.75% while it was highest in Presco with 6.21%. The contribution per unit risk incurred was highest in 2000 in Okomu(3.25%), Presco(6.44%) in 2003, Okitipupa(3.96%, 17.11% and 7.66%) in 2004, 2007 and 2008. The test of risk-return relationship shows high r of 0.8, 0.88 and 0.74 for Afprint, Okitipupa, and Okomu respectively. There exist low r of 0.19,and -0.45 for Livestock and Presco respectively. On the whole we have 27 significant positive beta stocks, 3 neutral stocks, 7 negative beta stocks and 9 insignificant beta stocks.

On the average the most profitable stock is Okitipupa Oil Palm with average return of 20.50%, followed by Okomu Oil Palm with 14.54% and Presco with 3.93%. Afprint with -5.15% and Livestock Feeds with -18.84% were loss making entities during the period of study. The most risky stock was Afprint with average risk of 21.03, followed by Presco, Okomu, Livestock and Okitipupa with 13.89, 10.83, 10.73, 3.20 respectively. The stock with the highest affinity to market return was Afprint, followed by Livestock Feeds, Presco, Okomu, and Okitipupa with beta of 1.23, 0.85, 0.69, 0.64, and 0.03, respectively. Finally the stock with the highest affinity to risk was Okitipupa and Afprint with strong positive risk-return relationship of 0.88 and 0.80 and r^2 of 77.89 and 64.65 percent respectively.

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