THE RISK - RETURN RELATIONSHIP OF COMPANIES QUOTED AT THE NAIROBI STOCK EXCHANGE

BY

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DECLARATION

This Management Research Project is my original work, and has not been submitted for the award of a degree in any other University.

Signed **Date**

..... **……**

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This Management Research Project has been submitted for examination with my approval as the University Supervisor.

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DEDICATION

This MBA Project is dedicated to my beloved parents Mzee Njuga Ngujo, Luvuno Chonga Njuga and Uchi Mrima Njuga. Special dedication also goes to my dear wife Lilly Kashero and my 10 months' old baby, Prince Barawa Gambo.

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ABSTRACT

Objective of the study was to establish whether there is a risk - return relationship for companies operating in the Main Investment Market Segment (MIMS) of the Nairobi Stock Exchange. The examined Companies in the MIMS are classified into four sectors, viz; Agricultural Sector, Commercial & Services Sector, Finance & Investment Sector and the Industrial & Allied Sector.

The study was carried out on an exploratory basis to establish whether there exist any differences in the risk- return patterns of quoted companies in the four sectors of the MIMS market segment of the NSE. Thirty four (34) companies were selected to comprise the sample of study for the period January 2005 to December 2009. Historical monthly stock price data was used, translating into 60 sample months for use in data analysis. Descriptive statistics were used in analysis of data as most of the data collected is quantitative in nature. The sample mean and standard deviation of returns was calculated and mean-variance ratios (Sharpe ratios) thereafter computed.

Initial analysis on the sectors riskiness based on standard deviation and beta computations indicated that the Agricultural sector was the least risky while the Industrial sector was the most risky. Using Sharpe ratios, the results indicate that Agricultural sector had the highest Sharpe ratio at 3.756 and thus the most risky among the 4 sectors while Industrial Sector had the lowest Sharpe ratio of 1.553 and therefore the least risky. To resolve the mixed results, a t-test was applied with mean variances per sector tested against the market variances. The analysis concludes that Standard deviations, betas and Sharpe ratios from the 4 sectors of MIMS were not very much different from the market mean variations during the period under study January 2005-December 2009.

The study showed that there is a link between the sectors in MIMS in which for every period when one sector is having poor returns, another sector will either benefit immensely or be adversely affected. However, the difference in returns for the various sectors seems to be insignificant. This implies that the assumed risks by policy makers might not have existed. Policy makers should therefore explore other ways of segmenting the NSE Market.

CHAPTER ONE: INTRODUCTION

1.1BACKGROUND OF THE STUDY

The Nairobi Stock Exchange

Capital markets world over remain central avenues for mobilization of resources and efficiently allocating such resources for economic development. An important organ for capital markets is the stock exchange. A stock exchange is a market for securities such as shares and stocks, treasury bills and bonds, options and derivatives. In Kenya, the functions of the stock market are carried out by the Nairobi Stock Exchange (NSE).The NSE was constituted in 1954 as a voluntary association of stockbrokers registered under the Societies Act. The listed companies were then very few. In the recent past, the stock exchange has undergone major changes and transformations and the level of activity has tremendously increased. A lot of interest in the stock exchange was generated in the 1980s when the government embarked on a privatization program targeting state corporations such as Kenya Commercial Bank and Kenya Airways.

In January 1991, the NSE changed its status into a company limited by guarantee. It also changed its trading system from the old "call-over" system to the floor based "Open Outcry" System. The realization of the critical developmental role played by the stock exchange and the capital markets at large saw the creation of the Capital Markets Authority in 1992 through an Act of parliament, the Capital Markets Act, Cap. 485A of the laws of Kenya. A number of accompanying regulations have since been enacted.

In July 1994, the NSE was relocated to a more organized location at the Nation Centre. In that year, the International Finance Corporation (IFC) Capital Markets Division rated the NSE as the world best performing emerging market having posted a return of 179% in dollar terms. It is reported that the NSE 20-Share Index recorded an all time high of 5030 Points on 18th February 1994.During the year 2000, the Nairobi Stock Exchange embarked on a major reform of the market dubbed "Market Segmentation and Re-organisation". The reform process involved segmenting the market into four independent segments, viz:- The Main Investments Market Segment (MIMS) which has the highest listing financial requirements with respect to net assets and share capital at Kshs. 50

million and Kshs. 100 million respectively; the Alternative Investment Market Segment (AIMS) where listing financial requirements on net assets and share capital are at Kshs. 10 million and Kshs. 20 million respectively; the Fixed Income Security Market Segment (FISMS) where Treasury Bills & Bonds and Corporate Bonds are traded and the Futures and Options Market Segment (FOMS) which is still dormant to- date.

All market participants were allowed a transition period that extended to the year 2001 to enable them to implement the changes that would have made them listed under the appropriate segment of the market. During this period, existing companies listed at the Stock Exchange were reclassified into the AIMS and MIMS. Presently, there are 8 companies listed on the AIMS and 47 companies listed on the MIMS. Further reforms at the Stock Exchange were carried out in the year 2005 when physical share certificates were converted into electronic form through the Central Depository and Settlement System following the enactment of the Central Depository and Settlement Corporation (CDSC) Act. In the year 2006, the Open Outcry Trading System was replaced by the Automated Trading System (ATS) which automated the matching of sale and buy orders amongst participants at the NSE. Through the ATS, brokers can meet and trade at the floor of the NSE or choose to trade at the comfort of their offices through the Wide Area Network. There are currently plans to demutualise the stock exchange to allow for its wider ownership unlike the present structure where it majorly owned by stockbrokers.

Sectoral risk –return relationship

The NSE equity market is currently broadly segmented into the Main Investment Market Segment (MIMS) and Alternative Investment Market Segment (AIMS). The MIMS is further segmented into four sectors namely the Agricultural Sector, Commercial & Services Sector, Finance & Investment Sector and the Industrial & Allied Sector. Each of the four sectors in the Main Investment Market Segment is likely to have distinct risk and return patterns over time. The risk -return pattern associated with each of the four sectors will be referred to as the Sectoral Risk- Return relationship in this study. Sectoral return will be measured by the average return of the companies operating the sectors under study whereas Sectoral risk will be measured by the variability of returns experienced in every sector over time.

1.2 STATEMENT OF THE PROBLEM

It is the wish of every investor to make an optimal investment decision that would guarantee them a desirable level of return commensurate with the magnitude of risk taken. Unfortunately, the risk-return information is not easy to obtain, and if obtained, the cost of such information could be so high leading to reduction in the level of expected returns or negative returns. The problem is compounded for the unsophisticated investor who may not even know how and where to obtain such information. In Kenya, awareness about capital markets and the NSE to the general investing public is a recent phenomenon, and was spurred mainly by major Government divesture programmes in Kengen, Kenya Reinsurance Corporation and Safaricom Ltd which were affected over the last four years. Most investors made positive returns in the post Initial Public Offering (IPO) period. A number of events have recently happened that have seen the level of equity returns both globally and locally drastically reduce. These include the global financial crisis experienced in the years 2007 through 2008 and the infamous post-election violence in Kenya in early 2008. As opposed to the general perception among the investing public that the NSE assured them of a positive return especially post IPO, the recent crumbling of stock prices has left the public appreciating that there are indeed risks associated with investment in stocks. To the immense benefit of the unsophisticated investor at the NSE, this study seeks to explore whether an investment strategy focusing on a specific sector of the NSE equity market (Agricultural Sector or Commercial & Services Sector or Finance & Investment Sector or Industrial & Allied Sector)will lead to superior investment returns at minimal risk exposure. The current study is further motivated by an observation that recent studies (as explained in ensuing paragraphs) carried out at the NSE have not been quite explicit as to whether it is possible to make superior returns if an investor concentrated in a specific industry as proxied by the sectoral segmentation of the MIMS.

Kamau (2002) examines the risk-return relationship of companies quoted on the Main Investment Market Segment (MIMS) and the Alternative Investment Market Segment (AIMS). The study utilized historical market data from the Nairobi Stock Exchange for the period between January 1996 to December 2000. Individual companies Sharpe Ratios for the entire period were computed and analyzed. Differences between Sharpe Ratios of

companies listed under the Main Investment Market Segment and those of companies listed under the Alternative Investment Market Segment were analyzed using Wilcoxon Rank Sum Test. The research found out that there exists no significant difference in terms of return and risk between those companies listed under the Main Investment Market Segment and the Alternative Investment Market Segment. Kamau's (2002) study is based on fairly broad classification of the NSE Market into AIMS and MIMS. He further cautions against wholesome adoption of the research results on the fact that the period of research which was 1996-2000 was characterized by political activism and a depressed Kenyan economy. Further, the trading systems during the period of research were still manual, which could have affected the efficiency of the NSE and the pricing of assets. A lot of reforms have been undertaken at the market since the year 2000 including the adoption of the Automated Trading System and the Central Depository and Settlement Systems. The current study seeks to improve on Kamau's (2002) study by using more recent data and further segmenting the Main Investment Market Segment into the Agricultural Sector, Commercial & Services Sector, Finance & Investment Sector and the Industrial & Allied Sector.

Ombajo (2006) studies the extent to which the NSE market segmentation affected the share prices of listed firms, liquidity and investor recognition. The event- study methodology pioneered by Fama *et al*. (1969) was employed in carrying out the study. The study was also concentrated the MIMS and the AIMS. The segmentation of the NSE market was taken as the event and the event date taken as 1st February 2001 which was the actual date of operationalization of the NSE segments. The study established that segmentation of the market affected the liquidity and returns of firms both in the MIMS and AIMS. Firms that were re-classified into the AIMS segment ended up being more adversely affected as the segment was widely considered as an inferior segment.

The research gap in Kenya as alluded by the studies cited above and other studies reviewed has been lack of industry on risk –return relationships. This study intends to address this gap by establishing whether there are industry risk - return patterns for companies quoted at the NSE examining the sectors falling under the Main Investment Market Segment which currently are classified as the Agricultural Sector, Commercial & Services Sector, Finance & Investment Sector and the Industrial &allied Sector.

1.3 OBJECTIVE OF THE STUDY

To establish whether there is a risk - return relationship for companies operating in the Main Investment Market Segment of the Nairobi Stock Exchange.

1.4 IMPORTANCE OF THE STUDY

The study will benefit individual investors, especially the unsophisticated investors, to make informed investment decisions based on the relative risk - return characteristics of companies quoted on the four sectors of the Main Investment Market Segment, thereby averting losses that many Kenyan investors may suffer as a result of decisions that have in most cases been based on euphoria, gut feeling, rumors and hearsay.

The study will also benefit investment professionals such as licensed stockbrokers, investment advisers, investment bankers and fund managers in appreciating empirically industry specific risk-return characteristics of companies operating in the four sectors under MIMS at the NSE, thereby being guided into asset allocation decisions in a bid to maximize value for their clients.

The study will also benefit regulatory authorities such as the Capital Markets Authority and Nairobi Stock Exchange in understanding whether the segmentation of the NSE equity market influences the perception of riskiness associated with a certain sector and the observed returns. This will be useful in formulating an improved segmentation criterion for the NSE market.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter examines various theories and empirical studies that have been conducted in the area of investment risk and return. The Portfolio Theory as advanced by Markowitz (1952) has been reviewed. Subsequent asset pricing models such as the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) have been looked into. Empirical studies, both local and foreign in the area of stock returns have also been reviewed. The chapter is concluded by summarizing the research gaps identified.

2.2 Portfolio Theory

A portfolio is a collection of securities. As most securities available for investments have uncertain returns and thus risky, one needs to establish which portfolio to own. This problem has been referred to as the portfolio selection problem. In an attempt to solve this problem, Markowitz (1952) published a landmark paper that is generally viewed as the origin of modern portfolio theory approach to investing.

Markowitz asserts investors should base their portfolio decisions solely on expected returns and standard deviations. Investors should estimate the expected return and standard deviation of each portfolio and then choose the best one on the basis of these two parameters. Expected return can be viewed as a measure of potential reward associated with any portfolio over the holding period and standard deviation can be viewed as a measure of the risk associated with the portfolio.

The assumptions of nonsatiation and risk aversion are made in the Markowitz approach. Under nonsatiation, investors are assumed to always prefer higher levels of terminal wealth (end –of –period) to lower levels of terminal wealth. The reason is that higher levels of terminal wealth allow the investor to spend more on consumption at $t = 1$ (or in the more distant future). Thus, given two portfolios which have the same standard deviation, the investor will choose the portfolio with the higher expected return. However, it is not quite so obvious what the investor will do when having to choose between two portfolios having the same level of expected return but different levels of standard deviation. This is solved by assuming that the investor is risk- averse i.e the investor will choose the portfolio with the smaller standard deviation.

The Markowitz portfolio selection problem can be viewed as an effort to maximize the expected utility (satisfaction) associated with the investor's terminal wealth. The relationship between utility and wealth is the investor's utility of wealth function. Under the assumption on nonsatiation, all investors prefer more wealth to less wealth. Each investor may derive a unique increment of utility from an extra shilling of wealth i.e. marginal utility. A common assumption is that investors experience diminishing marginal utility of wealth. An extra shilling of wealth of wealth provides positive additional utility, but the added utility produced by each extra shilling becomes successively smaller. An investor with diminishing marginal utility is necessarily risk-averse.

The Markowitz approach also makes use of indifference curve analysis in solution of the portfolio selection problem. An indifference curve represents a set of risk and expected return combinations that provide an investor with the same amount of utility. Because indifference curves indicate an investor's preferences for risk and expected return, they can be put on a graph where the horizontal axis indicate risk as measured by standard deviation and the vertical axis indicates reward as measured by expected return. The investor is said to be indifferent between any of the risk-expected return combination on the same indifference curve. An investor has an infinite number of indifference curves. Risk- averse investors are assumed to consider any portfolio lying on an indifference curve farther to the northwest to be more desirable than any portfolio lying on an indifference curve that is not as far northwest.

The expected return on a portfolio is a weighted average of the expected returns of its component securities, with the relative portfolio proportions of the component securities serving as weights. The standard deviation of a portfolio depends on the standard deviations and proportions of the component securities as well as their covariances with one another.

Since an infinite number of portfolios can be constructed from a set of securities, the problem is to determine the most desirable portfolio. The Efficient Set Theorem states that an investor will choose his or her optimal portfolio from the set of portfolios that; (i) Offer maximum expected return for varying degrees of risk ; and (ii) Offer minimum risk for varying levels of expected return. The set of portfolios meeting these two conditions is known as the efficient set (also known as efficient frontier). The process

will first involve identification of the feasible set which represents all portfolios that can be formed from a given number of securities. The investor will then select an optimal portfolio by plotting his or her indifference curve on the same figure as the efficient set and then proceed to choose the portfolio that is on the indifference curve that is farthest northwest. This portfolio will correspond to the point at which an indifference curve is just tangent to the efficient set. An investor's optimal portfolio is located at the tangency point between the investor's indifference curves and the efficient set.

2.3 Capital Asset Pricing Model

Although mean-variance analysis has been advocated as a framework for making investment decisions, a major problem of investment has been how to determine expected rates of return. Asset -pricing theories attempt to provide a solution. Asset-pricing theories try to explain why certain capital assets have higher expected returns than others and why the expected returns are different at different points in time.

Capital asset-pricing model (CAPM) is considered the most basic asset-pricing model. The model was developed independently by Sharpe (1964), Lintner (1965 a,b) and Mossin (1966). Basically the theory asks the question: What are the equilibrium rates of return if all investors apply the mean- variance criterion to an identical mean-variance efficient set? There is an ongoing debate as to whether this theory gives an accurate description of equilibrium rates of return and whether alternative theories are more appropriate. Nevertheless, the CAPM is still widely used in practice.

CAPM is known to have three most important implications. Firstly, in equilibrium, all investors irrespective of their risk preferences hold the market portfolio of risky assets. Still, different investors hold different combinations of the market portfolio and the riskless asset. This property is known as the separation principle. Secondly, since everybody holds the market portfolio, the risk of an individual asset is characterized by its covariance with respect to the market; the remaining risk is diversified away. A standardized measure of the covariance with the market is known as the market beta. Lastly, since nonsystematic risk is diversified away, investors need to be compensated for bearing systematic risk (as measured by market beta) but not for non-systematic risk.

The security market line (SML) formalizes this principle by linking the expected return of an asset to its market beta.

There are various assumptions behind the capital asset pricing model as explained below;

It is assumed that the capital market is characterized by perfect competition. There are a large number of investors, each with wealth that is small relative to the total market value of all capital assets. Hence the portfolio choice of individual investors has no noticeable effect on the prices of securities; investors take the price as given. It is also assumed that all investors choose their portfolio according to the mean variance criterion. It is important to note that the mean-variance criterion ignores practical considerations such as transaction costs and taxes. Also assumed is that all investors have the same expectations regarding the future in terms of means, variances and covariance. Further, it is assumed that investors have homogeneous expectations. This assumption requires that all investors have the same investment horizon and access to the same information. The model finally assumes that investors can borrow and lend at a risk- free interest rate. Again, the variance of the risk free asset, as well as the covariance with other assets is zero.

Under the assumptions above, all investors face an identical efficient frontier. The only difference between investors is the amount of wealth they must invest and the personal trade –off they make between portfolio mean and portfolio variance.

2.4 Estimating Beta

Beta is a measure of the volatility, or systematic risk, of a security or a portfolio in comparison to the market as a whole. Vasisec (1973) points out that are two ways of estimating beta i.e. regression analysis and capital asset pricing model (CAPM). He suggests that CAPM is used more commonly in academic finance. Investment practitioners on the other hand more often use the regression technique as it allows for a better explanation of returns pertaining to the market rather than a theoretical explanation of the overall return of an asset, which takes interest rates as well as market returns into account.

Regression is a statistical measure that attempts to determine the strength of the relationship between one dependent variable and a series of other changing (independent) variables. The two basic types of regression are linear regression

and multiple regression. Linear regression uses one independent variable to explain and/or predict the outcome of the dependent variable, while multiple regression uses two or more independent variables to predict the outcome. The general form of each type of regression is:

Linear Regression: $Y = a + bX + u$ ……*Eqn1*

Multiple Regression: $Y = a + b_1X_1 + b_2X_2 + B_3X_3 + ... + B_tX_t + u$……*Eqn2*

Where:

Y= the variable that we are trying to predict

X= the variable that we are using to predict Y

a = the intercept

b= the slope

u= the regression residual.

Customarily, beta is estimated from past data by least – squares regression procedures. This involves fitting a linear relationship between the rates of return on a security and the rates of return on a market index so that the sum of the squared differences between the security's actual return and those implied by the relationship is minimized.

For example, to estimate beta of a stock, a 60 month historical regression of the return on the stock (the dependent or Y variable) could regressed against the return on the market (the independent or X variable) as proxied by the return on the capital appreciation portion of the NSE 20 Share Index .

Capital Asset Pricing Model (CAPM) on the other hand is a model that describes the relationship between risk and expected return and that is used in the pricing of risky securities. It is expressed as;

$r_s = r_f + \beta_a(r_m - r_f)$……*Eqn3*

Where:

r_s = returnof the security

r_f= risk free rate

β_a = Beta of the security

r_m = Expected market return

The general idea behind CAPM is that investors need to be compensated in two ways: time value of money and risk. The time value of money is represented by the risk-free (r_f) rate in the formula and compensates the investors for placing money in any investment over a period of time. The other half of the formula represents risk and calculates the amount of compensation the investor needs for taking on additional risk (risk premium). This is calculated by taking a risk measure (beta) that compares the returns of the asset to the market over a period of time and to the market premium (r_m-r_f). The security market line plots the results of the CAPM for all different risks

In conclusion, CAPM is applied widely in practice for purposes of portfolio selection, performance evaluations, risk management and capital budgeting. However, it is argued by practitioners that it is difficult to obtain reliable estimates of alpha as a measure of excess return and beta as a measure of risk making CAPM a simple model that excludes many real –life considerations. Thus in addition to CAPM, practitioners use additional tools in choosing, monitoring and managing their investment portfolios.

2.5 Arbitrage Pricing Theory

Arbitrage Pricing Model (APT) like Capital Asset Pricing Model (CAPM) is an equilibrium pricing model. APT was developed by Ross (1976). However, CAPM is based on a different set of assumptions. In CAPM, it is assumed that all investors make investment decisions by a mean-variance rule. In APT, Ross does not assume risk-aversion or reliance on the mean- variance rule. Rather, APT explains the relationship between expected return and risk as arising because there are no arbitrage opportunities in security markets. It is based on the law of one price i.e. two items that are the same cannot sale at different prices.

Arbitrage is a strategy that makes positive return without requiring an initial investment. For example, opportunities for arbitrage arise from differences in an asset's price when this asset is traded on two or more markets. A profit with zero investment is made by buying the asset at the low price and simultaneously selling the asset at the high price. All investors would prefer such a strategy irrespective of their risk attitude (risk averse, risk-neutral or risk seeker). If investors can find a strategy that earns a positive return with a

zero net initial investment, then all investors will investors will follow this strategy. As a result, the price of assets will change until, in equilibrium, the positive return drops to zero and the arbitrage opportunity vanishes from the market. The APT is the risk-return relationship that applies in the equilibrium situation with no arbitrage opportunities.

In the capital markets, arbitrage could be exercised in short-selling of risky securities, where investors can sale shares they do not own. The investor borrows the shares from a broker and then sells the shares in the market to receive the proceeds from the sale. At some future date, the investor must buy the stocks in the market to replace the shares borrowed. When arbitrage opportunities are available, the economy is not in equilibrium. That is why APT is an equilibrium pricing model.

There are various assumptions underlying the APT. Firstly, it is assumed that the capital market is characterized by perfect competition. This implies there are a large number of investors, each with wealth that is small relative to the total market value of all capital assets. Hence the portfolio choice of individual investors has no noticeable effect on the price of the securities; investors take the price as given. Capital market imperfections such as transaction costs and taxes are assumed not to exist. It is secondly assumed that all investors have the same expectations regarding the future in terms of mean, variance and covariance terms (homogeneous expectations). Investors are also assumed to prefer more wealth to less wealth. No assumptions are made regarding risk attitude; investors may be risk - averse, risk-neutral or risk-seekers. APT also assumes existence of a very large number of capital assets exist in the economy. The number of assets is sufficiently large to create portfolios with no non-systematic risk and with any desired values for the factor sensitivity coefficients (betas). Finally, the theory assumes that short-sales are allowed, and that the proceeds are available to the short-sellers.

2.6 Empirical studies on industry risk-return dynamics on stock returns

Various studies have been undertaken both locally and internationally to explore the risk-return relationship of quoted companies. Kamau (2002) reviews the risk-return

relationship of companies quoted on the Main Investment Market Segment (MIMS) and the Alternative Investment Market Segment (AIMS). The study utilized historical market data from the Nairobi Stock Exchange for the period between January 1996 to December 2000. Individual companies Sharpe Ratios for the entire period were computed and analyzed. Differences between Sharpe Ratios of companies listed under the Main Investment Market Segment and those of companies listed under the Alternative Investment Market Segment were analyzed using Wilcoxon Rank Sum Test. The research found out that there exists no significant difference in terms of return and risk between those companies listed under the Main Investment Market Segment and the Alternative Investment Market Segment.

Gitari (1990) established that quoted companies in Kenya display a positive relationship between risk and return. The relationship was however not significant hence implying investors may end up being under or overcompensated for taking high risks. Munywoki (1998)in a study conducted at the NSE to estimate systematic risk approximated the systematic risk to be at 3.5% and market returns to be 14.8%. The study also estimated the NSE beta to be 0.9002 attributing the difference between his estimated beta and the beta of 1.0 to sampling. Ombajo (2006) carried out a study to determine the extent to which NSE market segmentation affected the share prices of listed firms, liquidity and investor recognition. The Event- Study methodology pioneered by Fama et al. (1969) was employed in carrying out the study. The study focused on the Main Investment Market Segment (MIMS) and the Alternative Investment Market Segment (AIMS). The segmentation of the NSE market was taken as the event and the event date taken as 1st February 2001 i.e. the actual date of operationalisation of the NSE segments. The risk and returns for companies on the MIMS and AIMS were computed for the period June 2000 to September 2001 i.e. 76 weeks of data. The stock returns during the estimation window, event window and post-event window were computed using the model

$$R_{it} = \frac{(P_{t-1} - P_t)}{P_{t-1}} \quad \text{.....} \textit{Eqn4}$$

Where:

R_{it} - is the stock's return in week't'

P_t - is the last traded price of the stock in week't'

P_{t-1} - is the last traded price of the stock in the week't-1'

The segment return R_s was computed as a series of the averages of the weekly returns for each stock constituting the segment as follows;

$$R_s = \frac{(R_{1t} + R_{2t} + R_3t \ldots R_{nt})}{n} \qquad \ldots\ldots\ldots Eqn5$$

Where:

R_s - Segment return

R_{1t} - Return of stock in week't'

n - Number of firms in the segment

The sample mean and standard deviation was calculated to establish the variance in returns and liquidity of MIMS and AIMS for the period before and after segmentation. The normal return and abnormal return within the event window was determined. The excess return was averaged across all firms in the sample and a standard error computed. The abnormal return was then tested if it is statistically different from zero by estimating the t statistic for each week, by dividing the average excess returns by the standard error. T- Statistics were computed using standard error that account for non-dependence of the data collected. 95% confidence level of estimate was used. The t- statistic was considered significant if the P value was less than 0.05.Ombajo (2006) observed that liquidity and returns were affected both for firms in the MIMS and AIMS. Firms that ended up in the AIMS were more adversely affected as the segment was widely considered as an inferior segment. The trading volume in the AIMS was comparably low. The cost of capital of firms in the AIMS thus went up. The results of the study did not support Jacque (2004) assertion that segmentation is a form of financial innovation which could lead to efficiency and thus a reduction in the cost of capital without a commensurate increase in systematic risk. No new listings were seen during the period of study after segmentation of the market implying that segmentation did not have an immediate impact on the cost of capital.

International studies on industry dynamics in stock studies have also been reviewed. Christen et al (2004) of the UK Department of International Development examine risks that agricultural ventures are exposed to and the various risk management models. The

paper cites weather, pests and disease as some of the calamities affecting the yield of crops. Risk in agriculture is also traced to farmers seeking to increase their incomes through higher-risk, higher-return cropping strategies. Markets and prices are additional risks associated with agriculture. Many agricultural markets are imperfect, lacking information and communications infrastructure. The prices that crops will sell for are unknown at the time of planting, and vary with levels of production (locally and globally) and demand at the time of sale. Prices are also affected by access to markets. As state-owned marketing organizations are phased out, small farmers face much higher price risks in many countries. And inelastic demand for many agricultural products causes small increases in production to result in large price swings.

Complicating the scenario is that decision making in agriculture is not an exact science; it depends on many variables that change from year to year and are beyond the farmers' control. Farmers have no real way of knowing how many others are planting a specific crop or how average yields will fare in any given year. Often, a good price one year motivates a lot of farmers to move into the same crop the next year. This shift increases production in the face of constant demand, driving down the price and making the crop much less attractive the following year.

With the entry of new players, growing competition in international markets can fundamentally change the competitiveness of a local industry, as with Vietnam's recent entry into the coffee industry at the expense of higher-cost producers in Latin America. The result has been millions of dollars of bad debt in commercial banks that specialize in lending to small coffee producers throughout Central America. The agricultural sector therefore stands to be a very volatile sector and very risky. In line with the risk-return theories, it is widely expected that the returns in this sector are hypothesized to be commensurate.

Hou *et al* (2003) in their article submitted to the Journal of Finance explore the link between industry product market characteristics and average stock returns. Their paper is part of a larger literature that links industrial organization to issues in financial economics. The sample used by in their study includes all NYSE, AMEX, and NASDAQ

listed securities with share codes 10 or 11 for the sample period 1973-2001. Industry concentration was measured using the Herfindahl index, which is defined as

$$\text{Herfindahl}j = \sum_{i=1}^{I} s^2_{ij}$$

where $s^2_{ij}$is the market share of firm i in industry j. The calculations were performed each year for each industry, and then the values over the past three years are averaged to ensure that potential data errors do not have undue influence on the Herfindahl measure. Hou *et al* (2003) argue that the structure of product markets helps to determine a firm's risk by affecting the equilibrium operating decisions it makes. They link industry concentration to stock returns through innovation and distress risk. Industries in which innovation risk and distress risk are higher are expected to command higher expected returns. Their analysis indicates that these are competitive industries. They also illustrate that firms in less concentrated industries earn higher stock returns, even after controlling for the usual suspects that affect the cross-section of average returns, such as size, book-to-market, and momentum. This holds both at the industry level and the firm level and is robust to alternative empirical specifications. Their results suggest a number of fruitful areas for future research such as the need for asset pricing models that explicitly incorporate features of product markets as determinants of asset returns. The findings in the Hou and Robinson paper ultimately raise more questions than they answer. Are there other mechanisms through which market structure affects stock returns? Does the link between market structure and stock returns impact firms' investment and financing decisions? How does it impact the diffusion of information in the market? Is the geographic scope of the industry (national vs. local product markets) important? These are some of the issues the authors of the paper suggest for further work. The current study seeks to explore the issue of industry dynamics in stock returns at the Nairobi Stock Exchange.

2.7 Conclusions from the literature review

Gitari (1990) established that listed companies in Kenya do exhibit a positive relationship between risk and return. The relationship was however not significant hence implying

investors may end up being under or overcompensated for taking high risks. Kamau (2002) found out that there exists no significant difference in terms of return and risk between those companies listed under the Main Investment Market Segment and the Alternative Investment Market Segment. Ombajo (2006) observed that liquidity and returns were affected both for firms in the MIMS and AIMS. Firms that ended up being re-classified from MIMS to AIMS were more adversely affected as the segment was widely considered as an inferior segment.

Most of the previous studies , especially local studies such as by Gitari (1990), Kamau (2002), and Ombajo (2006) looked into the risk-return dynamics of companies quoted in the NSE in a very broad way based on the segmentation of the NSE equity market into MIMS and AIMS which does not explicitly capture the industry characteristic of the quoted companies. The current study addresses this gap by examining the risk - return patterns of quoted companies operating in the different industries as defined by the sectoral classification in the MIMS. Also, most of the studies were carried out in late 1990s and early 2000s. This period was characterized by political activism and a depressed Kenyan economy. The results of the studies may not hold true today given the positive changes in the economic environment as well as the relative political maturity that the country has lately achieved except for the post election violence experienced in early 2008. In addition, the trading systems, such as the open outcry system, that were in operation during the time of the previous studies were largely manual. This could have affected the efficiency of operations, the flow of information as well the pricing of assets, all of which affect stock returns. A lot of reforms have been since been undertaken at the NSE including the adoption of the Automated Trading System (ATS)in 2005 and the full implementation of the Central Depository and Settlement System (CDSC) in 2006. These developments together with increased investor awareness education programmes by the CMA and NSE has led to more efficient trading operations. The current study will therefore seek to understand whether the results of previous studies still hold in the improved trading environment.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter examined the mode of execution of the study. It identifies the research design, the population of study, the sample used and the sampling technique. It further explains the data that was collected and its source. The chapter also tackles the measurement and operationalisation of variables used and finally the analysis of the data collected.

3.2 Research Design

The study was carried out on an exploratory basis to establish whether there exist any differences in the sectoral risk- return patterns of quoted companies in the Agricultural Sector, Commercial & Services Sector, Finance& Investment Sector and the Industrial & Allied. The differences found to exist were significantly evaluated and the reasons underlying those differences were established. Due to the historical nature of data collected, a quantitative approach was used where stock exchange data on stock prices was collected and analyzed. A similar design has been used by previous researchers in Kenya such as Kamau (2002) and Ombajo (2006) in related research topics. Use of the similar research design therefore enhanced consistency and comparability of the studies in as much as the previous studies largely concentrated on the broader classification of the market into MIMS and AIMS as opposed to specific sectors in the MIMS which was the focus in the current study.

3.3 Population of study

The target population of study was all listed companies operating in Kenya. The source of this population was the Nairobi Stock Exchange where a list of the quoted companies was obtained as at 31st December 2009. This date was identified as the cut-off date for the purpose of carrying out this study. At that particular time, there existed fifty four (54) quoted companies which formed the population.

3.4 Sample

Thirty four (34) companies were selected to comprise the sample of study. The sample was derived from quoted firms operating in the four sectors of the Main Investment Market Segment (MIMS) namely the Agricultural Sector, Commercial & Services Sector, Finance & Investment Sector and the Industrial & Allied Sector. The sample period was selected as January 2005 to December 2009. Monthly stock price data was used, translating into 60 sample months for use in data analysis. The study period was carefully chosen as the stock market experienced significant recovery during this period from the lull observed in late 1990s and early 2000. Further, earlier studies in Kenya on this area were based on market data for the periods prior to 2005.Purposive sampling was used so as to enable the researcher understand the risk-return dynamics of firms of the four sectors in the MIMS. This led to elimination of firms that traded inconsistently in the years and hence leaving out Uchumi Supermarkets, Hutchings Biemer, Carbacid, E.A. Marshals and BOC which were suspended in the course of the 2005-2009 period. Share prices were adjusted for dividends, rights issues, stock splits to ensure there was no price distortion as the returns were computed.

Table 3.1: classification of MIMS companies at the NSE

	Sectors in MIMS	**Total Sample**
1	Agricultural	4
2	Commercial and Services	5
3	Finance and Investment	11
4	Industrial and Allied	14
	Total	**34**

3.5 Data Collection

Average daily stock price data as well data on traded volumes were obtained from the NSE daily price lists maintained by the Nairobi Stock Exchange. The NSE daily price lists are historical in nature and were used as a secondary data source for this study. Reference was also made to periodic statistical reports generated by the NSE such as the weekly reports on the overall stock market performance. Commentaries made on the

annual reports of the sampled companies were also reviewed to obtain information on the performance of the various sectors in which sampled companies operate in. This enabled the researcher obtain additional information that assisted in making inferences towards the risk- return patterns observed from the statistical analysis of sectoral data.

3.6 Measurement of Variables

Average returns for individual companies as well returns for each of the four sectors were computed for the 60 sample months covered in the period January 2005- December 2009. Measurement of individual stock returns were modeled and operationalised as;

$$R_{it} = \frac{(P_{t-1} - P_t)}{P_{t-1}}$$

Where:

R_{it} - is the stock's return in month't'

P_t - is the last traded price of the stock in month't'

P_{t-1} - is the last traded price of the stock in the month't-1'

Sectoral return was measured as a series of the averages of the monthly returns for each stock constituting the sector as follows;

$$R_s = \frac{(R_{1t} + R_{2t} + R_3t \ldots R_{nt})}{n}$$

Where:

R_s - Sector return

R_{1t} - Return of stock in month't'

n - Number of firms in the sector

The variance and standard deviation of returns were measured and operationalised as follows:

$$\mathbf{S_n} = \frac{(R_{it} - R_s)^2}{n}$$

Where:

S_n - Sample variance

R_{it} - Stock's return in month't'

Rs- Sector return

n- Number of firms in sector

Standard Deviation, S_D were computed as;

$$S_D = \sqrt{\frac{(R_{it} - R_s)^2}{n}}$$

3.7 Data Analysis

Descriptive statistics were used in analysis of data as most of the data collected is quantitative in nature. Further, previous studies used a similar data analysis approach which made the use of this approach in the current study desirable for ease of comparison of results. The sample mean and standard deviation was therefore calculated for each of the four sectors in the MIMS. Mean-Variance Ratios or Sharpe ratios were then computed for all the four sectors. The normal return and abnormal return within the period of study was determined. The excess return as averaged across all firms in the sample was derived and a standard error computed. The abnormal return was then tested to find out if it was statistically different from zero by estimating the t statistic for each month, then dividing the average excess returns by the standard error. T- Statistics were computed using standard error that accounted for non-dependence of the data collected. 95% confidence level of estimate was used. T- Statistic was considered significant if the P value is less than 0.05.

CHAPTER FOUR: DATA ANALYSIS

4.1 Introduction

The main objective of the study was to establish whether there exist any differences in the sectoral risk- return patterns of quoted companies in the Agricultural Sector, Commercial & Services Sector, Finance & Investment Sector and the Industrial & Allied. The selected companies had consistently operated in the same market under similar conditions as highlighted in the period between January 2005 and December 2009. The monthly security returns are given in Appendix 1. From table 2 the classification and various statistics of the MIMS sector are highlighted according to the sectors Agricultural, Commercial, Finance and Industrial. For purposes of grammar, these four names will be use to represent Agricultural services, Commerce & Allied, Finance & Investment and Industrial & Allied respectively.

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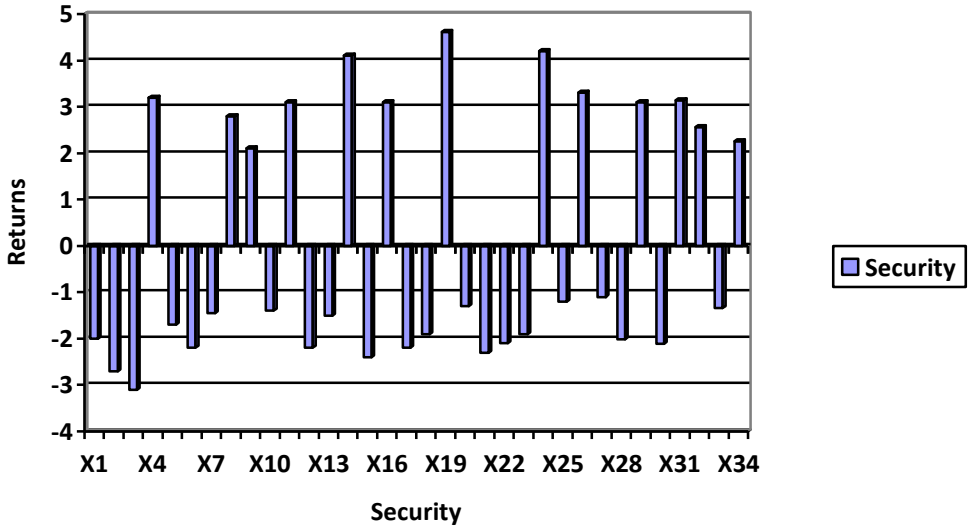
4.2 Returns of Securities

From figure 1, the average monthly returns of securities listed under MIMS show a good positive average returns for some sectors. Thirteen companies including, X4, X8, X9, X11, X14, X16, X19, X24, X26, X29, X31, X32, and X34 had positive returns. The average returns for the rest of the companies are negative. The security with the highest average monthly return is X19 with an average return of 4.612 percent while the security with the lowest average monthly return is X6 with an average return of -2.604 percent. The MIMS had most of the average returns for the companies at around 2 percent or below. The sector exhibited low average returns a performance that could be attributed to uncertainties in investment environment with increased risk assumption following the massive political upheavals the country has had during the period. It is during the period that Kenya had the initial referendum for constitutional amendment in 2005. This build the mood for the following 2 years towards elections in 2007 bringing tension in all trade sectors and affecting the returns of all securities. Further, the economy was badly affected during the post election period from 2008. All activities towards the stock markets took a downturn in the immediate aftermath of the violence in 2008. According

to the survey in 2009 (GoK, 2009), all economic development indicators were in a declining trend during these period.

Figure 4.1: Returns per individual company at MIMS



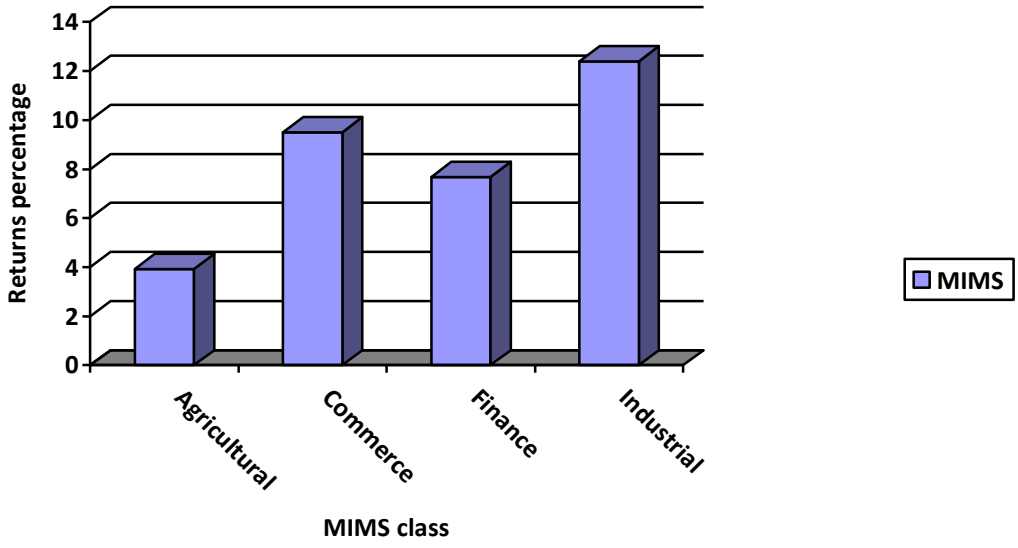
4.2.1 Returns of Securities per MIMS sector

From figure 2, the five year under study was characterized by low treasury bills rates due the vibrant economy mixed with growing fear of post election violence repercussions. The period also experienced high bank lending rates (on average, above 16% over the 2005-2009 period) an indication that the banks preferred investing in Treasury Bills to other risky investments such as loans or stocks thereby proving that Treasury Bills were better investments than stocks.

The four individual sectors of the MIMS including agricultural, commercial, finance and investment and industrial and allied posted different average returns in fluctuating manner over the period 2005-2009. The industrial and allied class had the highest positive returns at 12.4 percent for the period followed by commercial and services with 9.5 percent, finance and investment with 7.67 percent and finally the agricultural class with a low of 3.92 percent. This implies that the agricultural sector was a risky sector to invest in the MIMS followed by finance and investment, then commercial services and allied. The best class to invest in the MIMS was definitely the industrial and allied class

but the class requires heavy capital investment since the price of stocks in the class is generally very high. The high risk in agriculture class can be explained away as the period involved had many turbulences that affected farming activities including the referendum in 2005, approach to general elections in 2007 and post election violence after 2007-2008 that greatly affected the rift valley which is the bedrock of agriculture in the country.

Figure 4.2: MIMS returns per sector



4.2.2 Summary of Statistics

The summary statistics in table 2 provide information on the average returns, the standard deviations and betas as used in the intra-sector analysis. The class yearly returns were summed up then divided by 5 which is the total number of years under consideration for the study. The average returns were then used to derive other statistical measures including standard deviation, correlation, beta and Sharpe ratios.

Table 2: summary of individual firm securities – 2005-2009 period

Code	Firm	Mean Returns	Mean STDV	Mean β
X1	Unilever Brooke Bond Ltd	0.02	0.13805	0.45330
X2	Kakuzi	0.0196	0.22801	0.86744
X3	Rea Vipingo Plantations Ltd	0.1071	0.23291	0.85613
X4	Sasini Tea & Coffee Ltd	0.0071	0.14306	0.49761
X5	Car & General (K) Ltd	0.0517	0.21854	0.42898
X6	CMC Holdings Ltd	0.0971	0.30298	0.06687
X7	Kenya Airways Ltd	0.61	0.36443	1.05053
X8	Nation Media Group	0.0833	0.31568	0.83398
X9	Tourism Promotion Services Ltd (Serena)	0.0997	0.28207	1.10750
X10	Barclays Bank Ltd	0.0896	0.20688	0.76181
X11	C.F.C Bank Ltd	0.1279	0.26144	0.85304
X12	Diamond Trust Bank Kenya Ltd	0.0746	0.17236	0.72889
X13	Housing Finance Co Ltd	0.0767	0.26585	1.54174
X14	I.C.D.C Investments Co Ltd	0.0479	0.19381	0.77783
X15	Jubilee Insurance Co. Ltd	0.1096	0.28079	0.90506
X16	Kenya Commercial Bank Ltd	0.0988	0.29842	1.47221
X17	National Bank of Kenya Ltd	0.0124	0.40865	1.30642
X18	NIC Bank Ltd	0.1463	0.24517	1.18742
X19	Pan Africa Insurance Ltd	0.0888	0.22557	1.18431
X20	Standard Chartered Bank Ltd	0.0966	0.32456	0.96224
X21	Athi River Mining	0.0829	0.18626	0.54912
X22	Bamburi Cement Ltd	0.0892	0.35474	1.05775
X23	British American Tobacco Kenya Ltd	0.1025	0.27517	1.23732
X24	Crown Berger Ltd	0.1067	0.25498	1.23783
X25	Olympia Capital (Dunlop)	0.1054	0.31169	1.03745
X26	E.A.Cables Ltd	0.0738	0.28271	0.92103
X27	E.A.Portland Cement Ltd	0.1904	0.36869	1.24092
X28	East African Breweries Ltd	0.1638	0.39531	1.14768
X29	Firestone East Africa Ltd (Sameer)	0.1913	0.22140	1.01736
X30	Kenya Oil Co Ltd	0.3083	0.31504	0.66193
X31	Mumias Sugar Co. Ltd.	0.0617	0.18305	1.01066
X32	Kenya Power & Lighting Ltd	0.1309	0.47557	2.50039
X33	Total Kenya Ltd	0.0188	0.22943	0.89837
X34	Unga Group Ltd	0.0717	0.37071	1.51084

4.3 Risk Indicators

The study used key measures of risk as standard deviation and beta while applying Sharpe ratios and t-tests for verification of the results. Accordingly to table 3, the standard deviations ranged from 14.72% to 19.29%. The agricultural sector was the least risky with a standard deviation of 14.72%. This was followed by Commercial sector which had a standard deviation of 16.51% while Finance sector had a standard deviation of 18.28%. The industrial sector was the most risky with a standard deviation of 19.29%.Using the results of beta, Agricultural sector had a beta of 0.6686 followed by

Commercial sector with a beta of 0.9324, Finance sector with a beta of 1.0004 and finally Industrial sector had a beta of 1.1786. This now confirms that Agriculture was the least risky class while industrial was the most risky.

Using individual companies, results of table indicate that Kenya Power and Lighting from the industrial sector was the most risky security with a standard deviation of 47.56% and a beta of 2.50039. The least risky security was Unilever Brooke Bond's from Agricultural sector with a standard deviation of 13.08% and a beta of 0.453.

Table 3: Summary of class risk indicators

MIMS SECTOR	μ MEAN RETURNS	α STANDARD DEVIATION	β BETA
AGRICULTURAL	0.0392	0.14723	0.6686
COMMERCIAL	0.0767	0.16513	0.9324
FINANCE	0.0950	0.18280	1.0004
INDUSTRIAL	0.1242	0.19294	1.1786

4.4 Return versus Risk

According to Sharpe (2004), most people would choose an investment with a lower standard deviation with a lower risk if given a choice between investments with same expected returns but with different standard. However in a scenario where we have a higher return and a lower standard deviation between the two investments, the problem is best solved using Sharpe ratios which are a covariance of the standard deviations.

From table 4, the results indicate that Agriculture with the least standard deviation of 0.14723 had the highest Sharpe ratio at 3.756. This indicated clearly that Agricultural class was the riskiest among the 4 classes. Commercial sector had a Sharpe ratio of 2.513, Finance had 1.924 while Industrial had the least Sharpe ratio of 1.553.

The results in section 4.4 appear to contradict the results of section 4.3 which standard deviations appear to indicate Agricultural sector was the least risky while Industrial was the most risky and this required further resolution in the next section.

Table 4.4: The Sharpe ratios for MIMS sectors

MIMS Sector	Mean Returns	Standard Deviations	Sharpe Ratio
Agricultural	0.0392	0.14723	3.756
Commercial	0.0767	0.16513	2.153
Financial	0.0950	0.18280	1.924
Industrial	0.1242	0.19294	1.553

4.5 T-test for MIMS sectors against market variances

To finally resolve the contradiction, a t-test was applied in section 4.5 with mean variances per class of MIMS tested against the market variances.

4.5.1 T-test for Agricultural sector against market variances

From table 4.5 the computed value t of 0.284 is far much less than the critical t value 2-tailed of 2.013. This is a clear indication that the mean returns for Agricultural sector does not vary very much from the market return.

Table 4.5: t-test for agricultural sector versus the market

t-test: Two-sample assuming unequal variance		
	Agricultural	**Market**
Mean	0.039	0.500
Variance	0.022	0.019
Observations	34	34
df	46	
t-test	-0.284	
P(T<=t) one tail	0.389	
t Critical one tail	1.679	
P(T<=t) two tail	0.778	
t Critical two tail	2.013	

4.5.2 T-test for Commercial sector against market variances

From table 4.6, the computed value t of 0.588 is less than the t value of 2.104 implying that mean variation of commercial sector at 7.6% is not very much varying from the market mean return at 5.0%.

Table 4.6: t-test for Commercial sector versus market variances

t-test: Two-sample assuming unequal variance		
	Commercial	**Market**
Mean	0.076	0.0500
Variance	0.027	0.019
Observations	34	34
df	45	
t-test	0.588	
P(T<=t) one tail	0.280	
t Critical one tail	1.679	
P(T<=t) two tail	0.560	
t Critical two tail	2.014	

4.5.3 T-test for Financial Sector against market variances

From the results of table 4.7, the computed t value of 0.944 is less than the critical t value of 2.107 which indicate that the mean variation of the financial sector at 9.5% is not very much varying from the market rate at 5.0%.

Table 4.7: t-test for Financial Sector versus market mean variances

t-test: Two-sample assuming unequal variance		
	Financial	**Market**
Mean	0.095	0.0500
Variance	0.03434	0.019
Observations	34	34
df	43	
t-test	0.944	
P(T<=t) one tail	0.175	
t Critical one tail	1.681	
P(T<=t) two tail	0.350	
t Critical two tail	2.017	

4.5.4 T-test for Industrial Sector against market variances

From the results of table 4.8, the computed t value of 1.528 is less than the critical t value of 2.018 which implies that the mean return variation at 12.4% is not very much different from the market mean returns variance at 5.0%.

Table 4.8: t-test for Industrial sector versus market mean variances

t-test: Two-sample assuming unequal variance		
	Industrial	**Market**
Mean	0.124	0.0504
Variance	0.037	0.0193
Observations	34	34
df	43	
t-test	1.528	
P(T<=t) one tail	0.067	
t Critical one tail	1.682	
P(T<=t) two tail	0.134	
t Critical two tail	2.018	

From the preceding results, the analysis concludes that Standard deviations, betas and Sharpe ratios from the 4 sectors of MIMS were not very much different from the market mean variations during the period under study – 2005-2009

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Chapter 5 gives a summary of the entire research highlighting the conclusions, recommendations and suggestions for further research. The recommendations and suggestions are based on the findings in the previous chapter and the study objective.

5.2 Summary of findings and Conclusions

The study objective was to establish whether there was a risk - return relationship for companies operating in the Main Investment Market Segment of the Nairobi Stock Exchange with a historical use of data for the period 2005-2009 which constituted 60 months. Accordingly, the study viewed risk-returns in terms of the ratios and returns as per the sectors in the MIMS. The MIMS has four sectors namely agricultural, commercial& services, finance & investment and industrial sector. The initial analysis showed that there is a link between the sectors of MIMS in which for every period when one sector is having poor returns, another sector will either benefit immensely or be adversely affected. However, the difference in returns for the various sectors seems to be insignificant. This implies that the assumed risks by policy makers might not have existed. Measuring the risk-returns using different variables indicated reverse results with one measure indicating Agricultural sector to be the riskiest while the other measure indicated Industrial sector to be the riskiest.

With the above findings, investment decisions should be based on company specific information as opposed to the sector in which the company is categorized in the NSE market. Use of company Net Present Value towards making investment decisions may be a better approach that use of historical risk – return patterns displayed by the various sectors.

In view of this, a policy of full disclosure by all players in the NSE Market is required to ensure information is available for sound investment decisions, avoid any insider trading

that might lead to distortion of returns since tests have shown that all the sectors of MIMS can be shown to be either risky or not risky with differing measurement variables.

5.3 Limitations of the Study

As the study is based on historical data, it is always going to be difficult to make a conclusion from the findings which is usable to the future. The fact that data has been fully used and archived means that policy makers and academicians will always use projections in making any decisions for the future.

Data collection for such secondary data was carried out through a second party since an individual cannot collect data directly from the NSE trading floor nor gain access to the NSE database which contains the data. Price changes do not always indicate all facts or issues concerning a company. At the same time, most stocks appeared not to be traded consistently making it difficult to make reliable generalizations over the NSE market.

Some of the stocks under consideration were not consistently trading over the period of study. Indeed some were suspended over this period. These erratic trading patterns could have distorted stock prices and thus the results of the study.

5.4 Recommendations

Policy makers such as the CMA and NSE should review the impact of sectoral segmentation on the NSE market development.

It is also important that surveys are conducted to establish if investors purely make investment decisions based on risk – return considerations.

It is also important to establish the extent to which insider trading happens at the NSE and its impact on risk and return.

5.5 Suggested Areas of further study/ Recommendations

There is need to have a further study in the MIMS sector to establish the relationships among the sectors using another measurement of variables apart from risk-return. Another area of recommended study is the use of multiple factors instead of using singular variable measures.

Similarly, the periods in which stocks experience persistent fluctuations need to be established in order to enable policy makers have clarity on how to restore such stocks on the NSE market.

It is also recommended that a further study is done to establish if the NSE market segmentation has any influence on the Kenyan Investor decision making process.

Appendices

1: MIMS Companies at NSE (2005-2009)

Code	Company (MIMS SECTOR)
	AGRICULTURAL
X1	Brooke Bond Ltd
X2	Kakuzi
X3	Rea Vipingo Plantations Ltd
X4	Sasini Tea & Coffee Ltd
	COMMERCIAL AND SERVICES
X5	Car & General (K) Ltd
X6	CMC Holdings Ltd
X7	Kenya Airways Ltd
X8	Nation Media Group
X9	Tourism Promotion Services Ltd (Serena)
	FINANCE AND INVESTMENT
X10	Barclays Bank Ltd
X11	C.F.C Bank Ltd
X12	Diamond Trust Bank Kenya Ltd
X13	Housing Finance Co Ltd
X14	I.C.D.C Investments Co Ltd
X15	Jubilee Insurance Co. Ltd
X16	Kenya Commercial Bank Ltd
X17	National Bank of Kenya Ltd
X18	NIC Bank Ltd
X19	Pan Africa Insurance Ltd
X20	Standard Chartered Bank Ltd
	INDUSTRIAL AND ALLIED
X21	Athi River Mining
X22	Bamburi Cement Ltd
X23	British American Tobacco Kenya Ltd
X24	Crown Berger Ltd
X25	Olympia Capital
X26	E.A.Cables Ltd
X27	E.A.Portland Cement Ltd
X28	East African Breweries Ltd
X29	Firestone East Africa Ltd (Sameer)
X30	Kenya Oil Co Ltd
X31	Mumias Sugar Co. Ltd.
X32	Kenya Power & Lighting Ltd
X33	Total Kenya Ltd
X34	Unga Group Ltd

Appendix 2:

Code	Firm	Mean Returns	Mean STDV	Mean β
X1	Unilever Brooke Bond Ltd	0.02	0.13805	0.45330
X2	Kakuzi	0.0196	0.22801	0.86744
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X5	Car & General (K) Ltd	0.0517	0.21854	0.42898
X6	CMC Holdings Ltd	0.0971	0.30298	0.06687
X7	Kenya Airways Ltd	0.61	0.36443	1.05053
X8	Nation Media Group	0.0833	0.31568	0.83398
X9	Tourism Promotion Services Ltd (Serena)	0.0997	0.28207	1.10750
X10	Barclays Bank Ltd	0.0896	0.20688	0.76181
X11	C.F.C Bank Ltd	0.1279	0.26144	0.85304
X12	Diamond Trust Bank Kenya Ltd	0.0746	0.17236	0.72889
X13	Housing Finance Co Ltd	0.0767	0.26585	1.54174
X14	I.C.D.C Investments Co Ltd	0.0479	0.19381	0.77783
X15	Jubilee Insurance Co. Ltd	0.1096	0.28079	0.90506
X16	Kenya Commercial Bank Ltd	0.0988	0.29842	1.47221
X17	National Bank of Kenya Ltd	0.0124	0.40865	1.30642
X18	NIC Bank Ltd	0.1463	0.24517	1.18742
X19	Pan Africa Insurance Ltd	0.0888	0.22557	1.18431
X20	Standard Chartered Bank Ltd	0.0966	0.32456	0.96224
X21	Athi River Mining	0.0829	0.18626	0.54912
X22	Bamburi Cement Ltd	0.0892	0.35474	1.05775
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X26	E.A.Cables Ltd	0.0738	0.28271	0.92103
X27	E.A.Portland Cement Ltd	0.1904	0.36869	1.24092
X28	East African Breweries Ltd	0.1638	0.39531	1.14768
X29	Firestone East Africa Ltd (Sameer)	0.1913	0.22140	1.01736
X30	Kenya Oil Co Ltd	0.3083	0.31504	0.66193
X31	Mumias Sugar Co. Ltd.	0.0617	0.18305	1.01066
X32	Kenya Power & Lighting Ltd	0.1309	0.47557	2.50039
X33	Total Kenya Ltd	0.0188	0.22943	0.89837
X34	Unga Group Ltd	0.0717	0.37071	1.51084

Appendix III – t-test for MIMS during the 2005-2009 period

Test value = 0						
Company Code	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**95% confidence Interval**	
					Lower limit	**Upper Limit**
X1	0.706	33	0.478	0.0200	-0.0386	0.0786
X2	0.421	33	0.672	0.0196	-0.0767	0.1159
X3	2.252	33	0.034	0.1071	0.0087	0.2054
X4	0.243	33	0.810	0.0071	-0.0533	0.0765
X5	1.1173	33	0.253	0.0534	-0.0395	0.1428
X6	1.573	33	0.130	0.1600	-0.0309	0.2250
X7	2.151	33	0.042	0.0604	0.0061	0.3139
X8	1.447	33	0.358	0.0833	-0.0729	0.1937
X9	2.348	33	0.161	0.0992	0.0118	0.1868
X10	2.546	33	0.028	0.0891	-0.1300	0.0908
X11	1.297	33	0.108	0.1279	0.0168	0.1624
X12	1.313	33	0.027	0.0781	0.0157	0.2402
X13	1.213	33	0.208	0.0671	-0.0444	0.1936
X14	1.912	33	0.202	0.1467	-0.0443	0.1974
X15	1.621	33	0.237	0.0888	0.0090	0.2281
X16	1.753	33	0.068	0.0996	-0.0148	0.1923
X17	1.773	33	0.119	0.0829	-0.0379	0.2371
X18	1.498	33	0.093	0.0133	0.0043	0.1616
X19	2.181	33	0.089	0.0152	0.0023	0.3019
X20	2.111	33	0.148	0.1008	-0.0028	0.1812
X21	2.014	33	0.040	0.1678	-0.0029	0.3012
X22	1.832	33	0.047	0.1025	-0.0133	0.2183
X23	2.062	33	0.057	0.1008	-0.0003	0.2024
X24	1.287	33	0.111	0.1067	-0.0010	0.2143
X25	2.400	33	0.214	0.1064	-0.0202	0.2370
X26	2.029	33	0.025	0.0738	0.0789	0.3307
X27	4.232	33	0.054	0.1904	-0.0145	0.1378
X28	1.675	33	0.001	0.1638	-0.0780	0.3308
X29	1.432	33	0.071	0.1913	-0.7812	0.1156
X30	1.339	33	0.194	0.0617	0.1753	0.4414
X31	0.400	33	0693	0.3083	-0.0708	0.3308

X32	4.735	33	0353	0.1300	-0.0721	0.1325
X33	0.345	33	0.235	0.9880	-0.0634	0.1156
X34	0.947	33	0.126	0.0717	-0.0849	0.2282
Agriculture	1.0303	33	0.205	0.0392	-0.0230	0.1013
Commerce	2.275	33	0.033	0.0767	0.0069	0.1464
Finance	2.546	33	0.018	0.0950	0.0178	0.1722
Industrial	3.153	33	0.004	0.1242	0.0427	0.2056

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