THE RELATIONSHIP BETWEEN PORTFOLIO SELECTION AND PERFORMANCE OF LARGE CAPITALIZATION STOCKS IN KENYA

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DECLARATION AND RECOMMENDATION

Declaration

I declare this research project is my own original work and has not been presented for examination in any university or any other institution for the award of diploma, degree or any other certificate

Signature _____ Date_____

Idd Matano Mangwa

CM11/00751/13

Recommendation

This research project has been presented for examination with my approval as The University's Supervisor.

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DEDICATION

This work is dedicated to my immediate family members and friends who have offered unrelenting support throughout the study period. Thank you all and may God bless you!

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ABSTRACT

Stock markets form a very important component of wealth generation and wealth redistribution in the Kenyan economy. Given that Kenya is one of the fast Developing countries Africa, it has attracted a wide range of investors both local and foreign who have a high appetite in investing in local firms which have a high growth potential. Moreover, the Kenyan economy is growing at a significantly positive way reflecting to an increase in disposable income for the population such that they are able to put their disposable income into investments which are desirable and promising higher returns. The NSE provides one of the platforms for investment into the Kenyan economy and as such, it has generated the interest of many investors which has resulted to the development of various Indices in NSE and has made it necessary to analyze the performance of the Kenyan Stock Market which helps to guide investors on their diversification strategies. The study aimed at analyzing the relationship between portfolio selection and performance of the NSE with specific reference to the large cap stocks in Kenya. The study applied the Sharpe Single Index model for analysis. Firstly, the study established that there exists an inverse relationship between portfolio risk and performance of the large cap stocks in Kenya. Secondly, the study identified that there is an inverse relationship between portfolio return and performance of large cap stocks in Kenya. However, the inverse relationship between portfolio risk, portfolio return and performance of large cap stocks in Kenya is insignificant. This can be attributed to the various micro and macro-economic factors which influence the performance of the securities market. Thirdly, the study established that there exists a positive relationship between security weights and performance of the large cap stocks in Kenya. The study also noted the simplicity and suitability in application of the Sharpe single index model. The study recommended that investors should apply the SIM for portfolio construction and analyze assets with consideration of other market factors other than the risk free rate of return.

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LIST OF ABBREVIATION

CAP	Capitalization
CAPM	Capital Assets Pricing Model
CMA	Capital Market Authority
MPT	Modern Portfolio Theory
NASI	Nairobi All Share Index
NSE	Nairobi Securities Exchange
FTSE	Financial Times Securities Exchange
SIM	Single Index Model

CHAPTER ONE

INTRODUCTION

1.1 Background of The Study

A rational investor's intent is to maximize return while minimizing risk and due to this concept, the portfolio theory was developed by Harry Markowitz in 1952. Investors continually deal with the trade-off between risk and return while striving to maximize their growth potential with the minimum possible risk hence facing conflicting objectives of maximizing expected return and minimizing uncertainty or risk which must be balanced against each other. Thus, to make wise decisions in investment, there is a need for knowledge on security analysis and portfolio management (Nalini, 2014).

The objective in portfolio selection is reducing the investment downside risk while maximizing the intended returns for wealth maximization. One of the main advantages of investing in more than one asset is the possible reduction of risk. Intuitively, by sharing resources among several different assets, even if one of them has a disastrous (very low) payoff due to its variability, chances are the others will not and as such, reduces the level of loss that could have been experienced should all the resources had been invested in a single asset.

Risk refers to the probability of financial loss facing an investor who has committed funds into an asset or assets. It occurs when the actual returns differ from the expected return that had attracted an investor into investing in a particular asset or combination of assets. Thus, it is the volatility of future returns from an investment. Return on the other hand is the basic motivating force and the principal reward in any investment process. Return is measured as the gain or loss to an investor over a given period of time. Markowitz (1952) settled on the idea that investors would demand higher returns on a market portfolio than a risk-free investment, the relationship between risk and return has been subjected to extensive theoretical and empirical enquiry (Mandimika and Chinzara, 2010).

The risk-return trade-off is explained by the Capital Asset Pricing Model (CAPM), which relates the required return on investment to the risk of undertaking such an investment. Specifically,

Merton's (1973) Inter-temporal Capital Asset Pricing Model (ICAPM) hypothesizes a positive correlation between expected return on an investment and the associated risk. The rate of return on an investment is weighted by the perceived risk of undertaking such an investment implying that a direct relationship between market risk and return for the reason that risk-averse investors require additional compensation for assuming extra risk (Raputsoane, 2009). The volatility of the return on the market portfolio is inversely related to the ratio of expected profits to expected revenues for the economy (Binder and Merges, 2001).

One well-understood and seemingly well-heeded investment axiom on investing is; don't put all your eggs in one basket (Qian, 2005) and according to Gregory, Matatko, & Luther, (1997); by holding a portfolio of diverse individual stocks, the risk level will be lesser than the risk inherent in holding any one of the individual stocks provided the risks of the various stocks are not directly related. Nawrocki, (1999) acknowledged that the Portfolio theory uses decision-making tools to solve the problem of managing risky investment portfolio. Some of the basic building blocks of modern portfolio theory are the mean-variance efficiency frontier of Markowitz, (1952) and the reward to variability ratio of Sharpe (1966). The risk of a stock portfolio depends on the proportions of the individual stocks, their variances, and their co-variances. A change in any of these variables will change the risk of this portfolio. It is generally true that when stocks are randomly selected and combined in equal proportions into a portfolio, the risk of the portfolio declines as the number of stocks increases (Evans and archer, 1968). Evans and Archer (1968) further observed that the risk reduction effect diminishes rapidly as the number of stocks increases.

As noted by Nyariji (2002), in consideration of the all securities in the NSE, to yield the maximum benefits of diversification required investors to make a portfolio consisting of 13 securities. However, with the same considerations, Mbithi (2015), found out that an optimal portfolio in the Kenyan Securities Market is made up of between 18-22 securities. According to a research done by Nalini (2014), in consideration to fifteen selected securities, the optimal portfolio in the BSE was made up of 4 securities which derived maximum returns for the investors.

Thus, via the use of portfolios, investors are able to come up with different combinations of assets which aids in the reduction of risk. Risk is one of the factors that hinder investors from committing their funds into particular assets due to the fear of loss. Therefore, Markowitz (1952) decided to come up with the efficient portfolio theorem which aimed at bringing out the possibility of investment combinations which would reduce perceived risk by investors while at same time maximizing the return potential that investors would yield from committing their funds into such asset combinations. Similarly, risk managers use portfolios to diversify away the un-priced risk of individual securities.

The Nairobi Securities Exchange (NSE) has a history that can be traced to the 1920's when it started trading in shares while Kenya was still a British colony (CBK, 1984). Ngugi, (2003) noted that while share trading was initially conducted in an informal market, there was a growing desire to have a formal market that would facilitate access to long-term capital by private enterprises and also allow commencement of floating of local registered Government loans. The exchange was constituted in 1954 as a voluntary association of stockbrokers registered under the Societies Act and was charged with the responsibility of developing the stock market and regulating trading activities (NSE, 1997).

Currently, it is regulated and supervised by theCapital Markets Authority (CMA) through legislative power of theCMA Act of 1989 that came into effect in 1990. The Authority supervises and regulates the activities of market intermediaries including the stock exchange, central depository and settlement system and all other persons licensed under Capital Markets Act. This capital market is thus a part of the financial markets that provides funds for long-term development facilitating mobilization and allocation of capital resources to finance long-term productive investments.

There are five indices in the NSE, the NSE-20 Share index, the FTSE Kenya 15 and 25 share Indices and the NSE All Share Index (NASI) which provide a basis of comparing the market performance. There are 64 companies listed on the Main Investment Market Segment (MIMS) of the NSE. Trading at the exchange is on the equities of these listed companies and immobilized corporate and government bonds (NSE, 2014). Osoro and Jagogo (2013) says that, to be effective, an index should be accurate; implying that the index movement must correspond to all

underlying price movements at the market so as not to mislead the parties who rely on the index for decision making as they undertake their investments. On its part, the FTSE Kenya 15 Index is a portfolio made up of the 15 large cap stocks in the NSE and was used for this research purpose.

1.2 Statement of The Problem

Stock markets provide an opportunity to earn significantly higher returns on investing in them. However, it involves significant proportions of risk. Unlike dealing in riskless investments where investors are certain of gaining some return without worry of losing their capital, when investing in the securities exchange, investors face a higher level risk of losing their money should their stocks fall in value. Risk and return analysis is important in making any decision regarding investing and the determination of an optimal portfolio within stocks can be achieved by the use of the Single Index (beta) Model as projected by Sharpe. According to Duncan (2008), given the high level of risk, the securities exchange has the potential for higher rewards, especially when putting more funds into the riskier securities. Mbithi (2014) says that most investors want to maximize returns without considering risk and this is attributed to the herd mentality. This study aimed at establishing the optimal portfolio size among the large cap stocks in the NSE Index and moreover, the study shows that the optimal portfolio size significantly changes with time making investors to be in a better position to determine their investment strategies on both the portfolio size and also on whether to take an active or passive investment strategy in addition to the ability to determine the best assets to commit their funds into.

1.3 Objectives of The Study

1.3.1 General Objective

To analyze the relationship between portfolio selection and the performance of the large cap stocks in Kenya.

1.3.2 Specific Objectives

i) To determine the relationship between portfolio risk and performance of large cap stocks in Kenya

ii) To establish the relationship between portfolio, return and performance of large cap stocks in Kenya
iii) To determine the relationship between security weights and performance of large cap stocks in Kenya

1.3.3 Research Hypotheses

i) H_o: There is no significant relationship between portfolio risk and performance of large Cap Stocks in Kenya
ii) H_o: There is no significant relationship between portfolio return and performance of large Cap Stocks in Kenya
iii) H_o: There is no significant relationship between security weights and performance of large Cap Stocks in Kenya

1.4 Significance of The Study

An investor can reduce portfolio risk simply by holding combinations of securities which are not perfectly positively correlated meaning that investors can reduce their exposure to individual asset risk by holding a diversified portfolio of securities. This study intends to provide the empirical evidence on the ability of risk minimization using the portfolio selections mechanisms by investors who engage the Stock exchanges as a means of creating and maintaining their wealth. This information helps investors who take into consideration the market capitalization of the desirable company stocks invested in to avoid under or over diversification thus exposing them to a reduced unsystematic risk and as a result further promote both local and international investor into committing their funds to our local listed companies that most likely positively contribute to the economic growth of our country. The study also moves out to find out whether the optimal portfolio size is a constant number or changes over time and as a result, it aids in understanding the reasons for the possible change or no change in the portfolio size. The study assists stock market investors in allocating their limited resources efficiently into a well-diversified portfolio guaranteeing maximum returns under minimum risk. Furthermore, this

study is a reference material for future researchers who would study on a similar field hence formulating a basis for further research.

1.5 Scope of The Study

The study was carried using data obtained from the Nairobi Securities Exchange and will only focus on securities listed in the FTSE NSE 15 Index. Data analyzed was for the two period starting 22nd December 2013 to 19th December 2014, while the second segment will consist of data from 22nd December 2014 to 19th December 2015. Given that the constituents of the FTSE NSE Kenya 15 Index change after every six months, each period was broken to two parts to reflect the changes.The Single Index Model of portfolio selection wasused in order to come up with the optimal portfolios over the different periods under study with the aim of analyzing the relationship between portfolio selection and the performance of the large Cap Stocks in Kenya.

1.6 Limitation and Delimitations of the Study

The major limitation that the study can encounter is the possible lack of all the necessary information for the individual companies under study. This may lead to reduction in the number of securities available for analysis. Moreover, since the FTSE NSE Kenya 15 Index was introduced in 2011, the periods under consideration are limited.

1.7 Operational Definition of Terms

Risk. This is the uncertainty of returns to be yielded from a capital investment. It is the chance of unfavorable event.

Return. This refers to the earnings generated from invested capital.

Systematic Risk. This is the risk that faces the entire market and cannot be eliminated by making portfolios

Covariance. Covariance is an absolute statistical measure of association of variables.

Stock Market. This is the market for trading of a corporate's securities for purpose of raising capital.

Stock Market Performance. This is an indication of the possible future price movement of the entire stock market or specific asset.

Diversification. This is the process of creating portfolios with an aim of reducing risk while maximizing returns.

Portfolio. This refers to two or more securities put together with an aim of reducing the uncertainty facing returns on the specific securities.

Portfolio selection. This is a statistical approach of determining the appropriate securities for consideration in making up a portfolio for investment purposes.

Optimal Portfolio. This refers to a combination of securities that yield the highest level of return and the lowest level of risk.

Portfolio performance. This is the evaluation of the performance of a managed portfolio in relation to the performance of a comparative benchmark.

Share Index. This is an individual measure of the stock market and a convenient indicator of the direction in which a stock exchange is taking over time.

Unsystematic Risk. This is the risk facing individual assets and can be eliminated by forming portfolios.

Capitalization. This refers to the market value of a company's outstanding shares.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The relationship between the conditional return and conditional variance of asset returns, also referred to as the risk-return relationship, has key relevance in areas within financial economics such as optimal portfolio choice and risk analysis (Aslanidis, Christiansen and Savva, 2013). Authors such as Ghysels, Santa-Clara and Valkanov (2004) describe this relation as the first fundamental law of finance. There is a common sense among financial investors to maximize the portfolio return while satisfying some risk constraint hence the Mean-variance technique in addition to the Sharpe Single Index Model to address this problem was developed (Pirvu, Kwak and Pourbabaee, 2014). According to Fama and French (1993), the traditional portfolio theory is a non-quantitative approach of creating a portfolio made of different assets as a way of reducing the overall risk of the portfolio. The objective is to select securities that have little or no correlation with each other enabling for reduction of portfolio risk.

Modern portfolio theory (MPT) as portrayed by Fama and French (1993), reduces portfolio risk by selecting and balancing assets based on statistical techniques that quantify the amount of diversification by calculating expected returns, standard deviations of individual securities to assess their risk, and by calculating the actual coefficients of correlation between assets, or by using a good proxy, such as the single-index model, allowing a better choice of assets that have negative or no correlation with other assets in the portfolio. Modern portfolio management differs from the traditional approach by the use of quantitative methods to reduce risk. The main objective of modern portfolio theory is to have an efficient portfolio, which is a portfolio that yields the highest return for a specific risk, or, stated in another way, the lowest risk for a given return. Profits can be maximized by selecting an efficient portfolio that is also an optimal portfolio, which is one that provides the most satisfaction — the greatest return — for an investor based on his tolerance for risk.

The study was guided by The Modern Portfolio Theory (MPT), Capital Asset Pricing Model (CAPM), the Utility Theory and the Efficient Frontier.

2.2 Theoretical Framework

2.2.1 The Modern Portfolio Theory

Whereas in actuarial science the law of large numbers plays a central role, this is not the case in portfolio theory. Muller, (1988), avowed that due to the correlation between the returns on financial assets, diversification allows in general only for a reduction but not for an elimination of the risk. Modern portfolio theory holds that the aim of the investor is to maximize return and minimize risk (Sharpe 1981; Brealey 1983).

Financial portfolios use Modern Portfolio Theory (MPT), which deals with problems of risk and return, to make investment allocation decisions. According to Ryals, Dias, and Berger, (2007), the bearing of MPT on business decision-making has been substantial such that the major capital spending projects by firms along with investment decisions are now routinely assessed for risk as well as return through the MPT for optimal decision making

While there are numerous methods and theories designed to aid with the asset allocation decision, Modern Portfolio Theory (MPT) remains to be the most popular. The theory condenses the often complex realm of investor goals and objectives into quantitative expected risk and return statistics. With volatility and return along with correlations between various asset classes, MPT states that investors can construct portfolios that are designed to meet the goals of investors. Markowitz (1952) presented variance as a meaningful measure of risk, and created a method of calculating the overall portfolio risk while taking into account the imperfect correlation of price movements between assets. When combining multiple assets that are less than perfectly correlated, the combined variance of the portfolio reduces. More so, he developed the model as a mathematical formulation of the concept for diversification, with the aim of selecting a combination of assets that collectively give lower risk than any individual asset would have produced. The Markowitz approach is a method to calculate mean-variance efficient portfolios. Hence, the Markowitz approach is based on mean-variance analysis, where the variance of the overall rate of return is taken as a risk measure and the expected value measures profitability. The theory produces a portfolio with the minimum variance given an expected return. The return from portfolio investment is expressed as the mean of expected returns of component assets while risk is expressed as variance of the asset returns. The MPT assumes for

investor rationality and markets efficiency as investors seek to minimize risk while maximizing on their returns.

For the proper understanding and application of the Theory, Markowitz made a number of important assumptions that; Each asset has a set of probable outcomes which can be thought of as a probability distribution, Investors aim to maximize their single period utility of wealth, Investors are risk averse meaning that they exhibit a diminishing marginal utility of wealth, Investors also estimate risk based on the variability of returns and that the Investors always base their investment decisions on the expected return and variance of asset or assets on consideration. For a given level of expected return, investors prefer lower to higher level of risk and similarly and similarly, for a given level of risk, the investors would always prefer a higher to lower level of the expected return.

The Modern Portfolio Theory links the expected rate of return of portfolio to the expected risk showing the importance of diversification in the minimization of portfolio risk hence its importance for consideration as it provides a mathematical linkage between the concept of risk diversification and the selection of a portfolio of assets (Mbithi, 2014). The model links the expected rate of return of portfolio to the expected risk indicating the importance of diversification to reduce the total risk of a portfolio of investments.

2.2.2 The Capital Asset Pricing Model (CAPM)

CAPM is an economic equilibrium theory about asset valuation which considers all the securities traded in a market simultaneously while explaining how their prices should behave. The Capital Asset Pricing Model is the best-known model used to determine the expected rate of return desirable for a variable income investment. Moreover, this model builds conceptually on the relationship between risk and return (Gavlaková and Gregová, 2013). The model was developed by William Sharpe in 1964 to show the relationship between a single asset risk and its return. CAPM is largely a part of the financial theory that is widely used by both academics and practitioners (Guo and Whitelaw, 2005). As the Markowitz mean variance analysis is concerned with how the consumer investors should allocate their wealth among the various assets available in the market, given that they are one-period utility maximizes as implied by the utility Theory and then the Sharpe asset pricing model uses the characteristics the consumer wealth allocation

decision to derive the equilibrium relationship between risk and expected return for assets and portfolios CAPM In finance is used to determine a theoretically appropriate required rate of return of an asset. Sharpe brought into light the relationship between an individual asset and portfolio return and determined that assets which were more responsive to the efficient portfolio should have higher expected returns.

According to Reilley & Brown (2012), in equilibrium, asset prices will adjust linearly with an asset's responsiveness to systematic risk of the efficient portfolio and the expected returns of the assets. Mbithi (2014) states that CAPM gives a precise prediction about the relationship between an asset and its expected return further providing a benchmark return for evaluating possible investments. CAPM can also be used in predicting the expected return of securities that haven't been traded. CAPM uses Variance and Standard Deviation to describe risk in portfolio scrutiny whereby a lower standard deviation reflects lower risk and vice-versa. The Standard deviation is used to show how return of a stock deviates from its expected return.

2.2.3 The Arbitrage Pricing Theory

According to this theory, an individual security's return is affected by various macro-economic variables. From its concept, mispricing of assets can result due to failure to consider the various aspects in the economy which have an effect on security prices. Therefore, the aspect of considering the risk free rate of return as the main influence on share price might result to poor decision making. Unlike CAPM, the arbitrate pricing model factors in elements such as inflation, investors' confidence in the securities market, the GDP and the long and short term interest rates as factors to consider in security valuation(Connor& Korajczyk, 1995)

The model has three basic assumptions for its functioning. Firstly, it aims at describing the risk-return relationship of an asset. Secondly, it holds that risk which is idiosyncratic can be eliminated by diversification. Lastly, it is based on the concept that an efficient financial market would never allow arbitrage opportunities to persist for a long period. This brings out the aspect as to why stock markets are closed down in case of unfavorable market conditions.

According to Connor& Korajczyk,(1995), the arbitrage model computes the projected return for an asset in consideration of sensitivity of the security to the multiple macroeconomic variables

movements. Unlike the single factor CAPM, APT incorporates both systematic and unsystematic risk factors in relation to return of the overall market. Thus the model is a multifactor approach to investment decision making.

2.2.4 The Utility Theory

The Utility Theory is used to explain risk and return assuming for rational and consistent investors. Consumers are perceived as choosing a particular bundle of goods and services, or a combination of work and leisure hours, or a set of taxes and public goods, that represents the optimum mix subject to the constraints of income and prices. Optimum simply means that no change can improve matters, and what is being optimized is utility or satisfaction (Juster, 1990).

In psychology, literature reveals that individuals have limited information processing capabilities, exhibit systematic bias in processing information, are prone to making mistakes, and often tend to rely on the opinion of others (Karimi, 2013). The Utility Theory is used to elaborate on the satisfaction derived by the consumers of goods by indicating how an investor would choose among alternative risky investments on the assumption that they will try to derive the greatest amount of utility.

As per the theory, there are three classes of investors. The first class consists of risk averse investors who will always select investments with the lowest level of risk regardless of the expected return of the investment. Secondly, there are Risk takers who will always select investment portfolios with the highest levels of return regardless of the level of risk. According to Sharpe & Alexander (1990) Risk takers will always attach greater weight to a nominal gain in wealth than the loss of an equal amount in wealth. An increase in wealth will derive to them a higher utility. There also exist Risk Neutral investors who often select investment portfolios without considering the possible equal risk and return. The attitude for an investor is best explained by the indifference curves which show the risk and return trade-off for the various investors. The utility based measures are more useful to understanding how investors make their choice in relation to their behavior and attitudes than has commonly been thought. Therefore, the utility theory is important in determining the optimal portfolio size for various investors based on their attitude towards risk.

2.2.5 Efficient Frontier

This theory states that there is a trade-off between portfolio risk and portfolio return. The more risk an investor is willing to accept, the higher the expected return of the investment. The efficient set consists of all possibilities that arise from combining various assets into a single portfolio and at varying weight levels. All assets combinations have correlation coefficient of between +1 and -1. The resulting envelope curve will contain assets that lie along the curve and such asset combinations are said to be the efficient portfolios hence deriving the efficient frontier (Bailey& Prado 2012). The efficient frontier is hence made up of portfolios with a maximum rate of return under a given level of risk or portfolios with a minimum level of risk under a given level of return. The efficient frontier entails that for a given amount of risk, there is an "optimal" portfolio that produces the highest possible return.

According to Bailey & Prado (2012), efficient Frontier Analysis helps investors, portfolio managers and executives to understand the tradeoffs between portfolio returns and risks helping them to allocate their scarce resources, by understanding the effect of scarcity on potential returns. The consideration of the efficient frontier would be necessary in determining the optimal portfolio for the various investors given their differences in risk preferences. It also serves to link the utility functions of the investors to their investment decisions.

2.2.6 Portfolio Selection

Portfolios are constructed by individuals or portfolio managers with an intention of achieving their goal which is to attain a maximum return with minimum level risk. According to Ravipati, the Markowitz's portfolio selection theory is one of the pillars of theoretical finance. The goal of portfolio selection is to find an optimal allocation of wealth across a number of assets.

According to Nalini (2014), construction of portfolios has two main approaches which are; the traditional and modern approaches. In the traditional approach, investors consider the dividends earned and the capital appreciation over time which are then evaluated and securities with a good outlook are selected as they meet investor satisfaction. In the modern approach, the Markowitz portfolio selection model is used as a selection criterion for the stocks to include in the portfolio basing on analysis of risk and return.

With the aim of extending the work done by Markowitz, William Sharpe considered market index whilst analyzing portfolios and ended up simplifying the amount and type of input data required for portfolio analysis. Sharpe made the numerous and complex computations essential to attain the optimal portfolio easier. This was by developing the Single Index Model which simplified both these computations and the construction of the optimal portfolio (R. Nalini, 2014). The SIM will be applied in the study to determine the portfolio return, portfolio risk and portfolio weights.

In the construction of an optimal portfolio, the portfolio return is determined by the return contribution of the selected stocks based on the proportion attributed to each of the considered security. It involves the various securities that yield different individual returns with the aim of either maximizing the portfolio return or minimizing the possible losses that are can be attributed due to adverse conditions in the securities market. Return is the motivational factor for investment. Individual and institutional investors are mainly concerned with the returns to be attained from their investment. The higher the return, the more attractive an investment opportunity will be(Alexeev & Tapon, 2012).

Financial assets as such are desirable depending on their attached a value. Their worth is based on the discounted earnings of their foreseen cash flows. Therefore, the return of a portfolio is a reflection of the expected returns that is attributable to the combination of securities. As explained by Aslanidis et. al. (2013), the expected return of a portfolio is represented by the mean of the expected returns of the constituent assets. Return is measured in-terms of the appreciation in share price over time. The share prices change over time due to the changes in various market factors such as changes in the level of risk. Different securities have different rates of return due to the differences in their operations which makes them react differently when faced with similar market conditions.

According to Nalini (2014), an asset's excess return is its return to risk aversion. It is the rate of return in excess of the 91 Day Treasury bill rate. It is measured against the risk free rate of return. Excess return is a measure of an asset's individual return against its beta with respect to the economic environment. The higher the ratio, the higher the excess returns exhibited by a

security. Thus, the attractiveness of a security solely depends on its promised excess return. This desirability is a function of the assets' excess return to its beta ratio.

Portfolio risk is the uncertainty regarding the returns of the optimal portfolio. Similar to the portfolio return, the portfolio risk is the made up of the contribution of each involved security in the construction of the optimal portfolio.

The different securities have different beta values which are combined in order to minimize the level of risk that is attained by the combination of the securities into making the optimal portfolio. The beta values are a measure of risk for securities. The risk entails a possibility of loss to an investor. The higher the possibility of incurring losses, the riskier a security is for an investor's consideration. Securities tend to react differently to market factors thus exhibiting different beta values during a given period. Investors normally have different utilities as such would invest in different securities having differentials in risk attractiveness. Often, the riskier an investment is, the more returns investors would expect to earn from it(Poornima & Remesh, 2015).

The attained portfolio risk depends on the contribution of the involved securities based on proportion of investment attributed to the specific securities considered. Not all securities that yield a positive mean return are meant to be included in a formation of an optimal portfolio. Thus, cut-off point is used to act as the benchmark for which a security has to be measured against for its consideration for inclusion in the optimal portfolio. Only those securities which have a higher excess return as compared to their cutoff are the ones which are to be selected to make the optimal portfolio.

A higher excess return ratio as compared to the cut-off point means that the security yields more than the average returns and has a considerable risk reaction which if combined with other securities will create a combination of securities that will yield the highest level of return at a given level of risk or a portfolio that will present the lowest level of risk at a given level of return (Nalini, 2015). Thus, securities are selected based on a criteria of a cut-off rate which is unique. Based on this criteria, only those securities having a higher ratio of excess return as to the beta values are to be considered for creating the optimal portfolio while those having a lower ratio being left out.

The cumulative values of the ratios, Ci often start to decline after reaching a certain value of the ratio. This highest point after being attained is used as a cut-off point. This stock ratio is thus a cut-off ratio C*. The weights of the securities involved are determined by a criteria attributed to the model of portfolio construction. The weights can be arbitrary selected where an investor can choose to apportion the investment equally to all the securities concerned or the investment can be apportioned based on a particular strategy(Ramanathan & Jahnavi, 2014).

2.3 Empirical literature

Nyariji (2001) determined the risk reduction benefits of diversification at the NSE and by using the mean-variance model of analysis; he found out that there was a significant risk reduction at the NSE as the portfolio grew in size up to 13 securities after which risk reduction became insignificant. The period under consideration was between 1996 and 2000 where he used the data of 49 companies listed on the NSE and used the weekly data of share prices and dividend distributions of the quoted securities.

Kamanda (2001) sought to find the relationship between the different equity portfolios of insurance companies and the NSE-20 share index where he used primary and secondary data to generate the portfolio returns and applied regression analysis to derive the beta. He used four models; the Sharpe, Jenssen, Treynor, and coefficient of variation models to determine the relative performance and the extent of diversification. He found out that quoted equity portfolios by the Kenyan insurance companies were defectively diversified and portfolios held by the insurance companies were outperformed by the market portfolio.

Zayimtsyan (2006) carried out a study that focused on theoretical and practical issues of portfolio management, particularly in constructing an optimal investment portfolio which would best suit the specific preferences of the investors. He considered preferences of investors in terms of their willingness to be exposed to risk and their expectations in terms of return from those investments they make. Expected portfolio return and standard deviation were used as quantitative measurements of investment decision making factors. He used the Markowitz's mean-variance model is used to determine the optimal investment portfolio, utilizing time series data on a number of financial instruments available to the Central Bank of Armenia (as the exemplary investor) to estimate the efficient investment frontier evaluating the investor's degree of risk

aversion on the basis of previous research. He concluded that investors consider the risk and return in making their investments.

Wang (2010) in his study argues that in the presence of the costs of over-diversification, there exist optimal stock holdings in which portfolio return could be effectively maximized and portfolio risk could be efficiently minimized without holding infinite number of assets. The study was based on the ordinary least square method (OLS) and generalized autoregressive conditional heteroscadesticity model (GARCH) on the data of Taiwan stock mutual funds, found that the optimal portfolio size in terms of the number of stockholdings could be between 21 and 24 with portfolio returns maximized and volatility minimized.

Tapon and Alexeev (2012) studied five developed markets (Australia, Japan, United States of America, Canada and the United Kingdom) to analyze the sizes of portfolios required for achieving most diversification benefits. They obtained their data from Thomson Reuters Data stream and consisted of daily total return observations on common stocks listed on the NYSE-AMEX, the NASDAQ, the London, Tokyo, and Australian stock exchanges between 1975 to 2011.They computed several widely-accepted measures of risk and used an extreme risk measure to account for black swan events. They found that investors concerned with extreme risk achieved diversification benefits with a relatively small number of stocks. The optimal portfolio size also changed from time to time depending on various market situations. For example, an Australian investor who takes standard deviation as a risk measure, the optimal portfoliosfrom1991 to 2007on average would be made up of 22 to 30 stocks in order to attain a 90% diversification. As from 1975 to 1987, to achieve a similar 90% diversification 90% of the time, the Australian investor would have needed to hold between 31 and 39 stocks which is a higher portfolio size. While considering the period between1988 and 2011, the portfolio size changed to between 34 and 52 shares. Based on their research, the number of assets that would yield maximum benefits of diversification varied from period to period depending on the economic factors across the different countries under consideration.

Omisore, Munirat and Nwufo (2012) reviewed the relevance of the modern portfolio theory as an investment portfolio tool in portfolio decision making. They established that many inherent flaws of the theory have marred the efficacy of the theory and along other considerations; the

simplistic assumptions and direct correlation of risks and returns as per the MPT were identified as significant flaws. They figured out that despite the limitations of the theory, the modern portfolio theory encourages for asset diversification. By utilizing the alpha and the beta coefficients which gauge an investment's performance, investors can be able to come up with a portfolio's risk and returns to coincide with their investment objectives while at minimum risk.

Iraya and Musyoki (2013) examined the performance of socially screened portfolio at the Nairobi securities exchange. They used a descriptive research design where the target population consisted of all the firms listed at the NSE. The risk adjusted returns was computed using the Sharpe index. The F and T-tests were used to determine whether there was significant difference between the risk adjusted returns of the two portfolios. The NSE-20 portfolio had a higher average Sharpe ratio than the social screened portfolio hence outperforming the socially screened portfolio when compared in terms of risk adjusted returns. The study concluded that social screening results in reduced portfolio performance in terms of the attainable returns.

Sakar (2013), in his study of the Optimal Portfolio Construction in the Dhaka Stock Exchange in Bangladesh, he moved out to determine the optimal portfolio size by using Sharpe's single index model. He used monthly closing prices of 164 stocks of the firms listed in the Dhaka Stock Exchange (DSE) and DSE all share price index from July 2007 to June 2012.From their findings, the optimal portfolio consisted of thirty-three securities.

Ramanathan and Jahnavi (2014) in a study to Construct an Optimal Equity Portfolio using the Sharpe Index Modelwith Reference to Banking and Information technology sectors in India they considered the single sector of media and entertainment for consideration in constructing the optimum portfolio. They had a sample population of 50 securities but took a sample size of 20 securities. They found out that 5 assets make up an optimal portfolio after using the Sharpe index model and furthermore they determined the equivalent proportion of investment that should be made in each asset to derive the maximum returns.

Nwakanma (2014) conducted a study to investigate Talmud and Markowitz diversification strategies using stocks quoted on the Nigerian Stock Exchange. The essence was to determine how each of these strategies compare with one another in terms of generating superior performance based on maximizing returns and minimizing risks. He examined the applicability

of diversification to the Nigerian stock exchange regarding risk reduction and return maximization. He used data of quarterly closing prices of 17 assets drawn from the Nigerian stock exchange for 17 years. Three hypotheses were formulated and tested using the difference between independent sample means (t – test). The null hypotheses of the three hypotheses were accepted implying that diversification can diversify away a reasonable amount of risk. He recommends investors to apply Talmud and the Markowitz diversification strategies.

Mbithi (2014) conducted a study to determine the optimal portfolio size for investors where he used the mean variance optimization model to obtain the optimal portfolio in the Nairobi securities Exchange. He used data from forty-three listed firms in the Kenyan securities exchange and found out that the optimal portfolio size was made up of between 18 and 22 securities.

Sen and Fattawat (2014) conducted a study on the Sharpe's Single Index Model and its Application in Portfolio Construction. Their objectives were to get an insight into the Single Index Model of Sharpe, to construct an optimal portfolio and to determine the return and risk of the optimal portfolio constructed by using Sharpe's Single Index Model. They used data from the BSE Sensex index for the time period of January 2010 to December 2013 on monthly basis. They found out that there exists a significant difference between the total risk of the optimal portfolio calculated using the Single Index Model and the Markowitz's model respectively. Also, they observed that the Sharpe's Single Index model gives an easier mechanism of constructing an optimal portfolio for rational investors by analyzing the reasons behind the inclusion of stocks in the portfolio and with their relevant weights. So far as the construction of optimal portfolio is concerned, there was similarity between the SIM and the Markowitz's model. Only Four securities were found to make the optimal using the SIM.

Nyasha and Odhiambo (2014) conducted a study on the Dynamics of stock market development in Kenya and painted the origin of the Kenyan securities market while tracing the reforms that it has undergone from its inception to the year 2013. They indicated that significant changes in areas such as regulation, trading, capitalization of the market, value of stocks traded, turnover ratio and the change in number of securities available for trading have a significant influence on the risk exposure of investors. They also noted the challenges that the NSE faces as it continues

to develop and such included; lack of investor awareness, low confidence, lack of competition, vulnerability to shocks and low level of liquidity of the market.

Waithaka (2014) conducted a study to determine the effectiveness of the NSE-20 share index in representing the overall market performance at the NSE. He used all securities in the NSE-20 Share Index and a sample from the NASI as from January 1st 2013 to December 31st 2013 for analysis and found out that there was a strong positive correlation between the market performance and NASI and a stronger positive correlation existed between the Market performance and the NSE-20 Share index. From the study, he concluded that there is no significant difference between the two indices and that the NSE20 Share index is a better market measurement index as compared to the NASI

From the literature review, it is clear that in Kenya; there has been limited research on optimal portfolio whereby they focus on stocks in the entire capital market without taking to consideration the various sectors and indices used to categorize the available stocks in the stock market of which the investors can narrow down for selection as an investment avenue. Similarly, the studies have yielded different results providing an opportunity for further analysis. This study will focus on analyzing the relationship between portfolio selection and performance of the NSE. By determining the optimal portfolio size among the large cap stocks, the results would reflect on the performance of the Stock exchange and it will be of help to individual and institutional investors alongside the corporate managers assisting them in identifying the best investment securities and the best portfolio size and furthermore assist corporate managers in their decision making and improve performance.

2.4 Conceptual Framework

The independent variable for the purpose of the study will be portfolio risk, portfolio return and the security weights attributable to the securities making up the optimal portfolio. The optimal portfolio is made up of those securities whose returns exceed the predetermined cutoff rate. The individual security's rate of return tends to influence the viability of the stock to be included in the portfolio since only the stocks with higher excess return are likely to be selected to be part of the optimal portfolio. Similarly, stocks with a lower stock risk are more desirable than those facing higher risk. Beta is used as the measure of risk while security returns are measured in term

of the variation of stock return over a period of time. The securities considered for making up the optimal portfolio are also selected based on their contribution towards the portfolio. The optimal portfolio is constituted by securities which have been combined in such a manner that at a particular level of risk, they would yield the highest level of return or, at a particular level of return, they would yield the lowest level of risk.

The dependent variable for purpose of the study is the performance of the NSE. The performance of the NSE is measured in terms of optimal portfolio size among the large cap stocks in the NSE. The fewer the securities making up the optimal portfolio, the better the performance of the NSE. This means that investors can only depend on fewer better performing stocks in their quest to yield the highest level of return. As such, when the securities market is performing well, investors need not to invest in many securities in order to reap the highest level of return. Investors thus should invest in fewer securities meeting a determined criterion that imply better than average returns that maximize returns at a particular level of risk. However, the more the securities, the poorer the performance of the securities market. This is a result of adverse conditions facing the securities market which requires investors to minimize risk while yielding a particular return. Thus, the investors are expected to have invested in stocks which reap the minimum amount of losses. The portfolio created yields the lowest level of risk at a particular level of return. Moreover, investors who desire a particular return are able to select securities that yield the desired return while at the lowest level of risk. With a higher return, it implies that investors are making gains in their investments implying a better performance by the index as opposed to a lower rate of return. Similarly, the higher the risk attributable to the optimal portfolio, the more likely the poor performance of the securities market.

The intervening variables involve factors that influence the individual stock risk and return and such include market interest rate, market regulations, inflation rate, unexpected market events and company performance. These factors have an impact to the level of risk facing the market and the individual securities in the securities market. They are the factors which influence the performance of the stock market other than the risk and return. These are the factors which guide investors in selecting the stocks to consider or not while creating portfolios.

Moderating Variables

Micro and Macro-Economic Factors

- Market Interest Rate
- Rate of Inflation
- Unexpected Market Events
- State of the Economy
- Regulations
- Company Financial Performance

Independent Variables

Dependent Variable

Portfolio Return

- Alpha value

Portfolio Risk

- Standard deviation
- Beta factor

Portfolio Risk

- Standard deviation
- Beta factor

Performance of the Large Cap Stocks in Kenya

- Optimal Portfolio Size

Figure 2. 1. Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Design

This study adopted a descriptive research design. According to Sekaran (2003); the goal of a descriptive design is to offer the researcher a profile to describe relevant aspects of the phenomena of interest from an individual, or industry oriented perspective. Mugenda and Mugenda (1999) refer to a descriptive research as a process of collecting data in order to answer questions concerning the status of the subjects in the study. Descriptive statistics is used to describe information or data using numbers. The characteristics of groups of numbers representing information or data are called descriptive statistics (Kay, 1997). Most of the earlier studies on optimal portfolio size have employed similar research design hence by using a similar approach; it would allow for the comparability of the results against the earlier findings.

3.2 Target Population

The Nairobi securities exchange consisted of 63 listed companies as at June 2015. However, the target population for the study was the 15 listed companies which are taken into account by the FTSE Kenya 15 Index. The research period was broken down into two segments of a year each in order to determine the possible differences in the optimal portfolio constituents and size over time. The first period of data was taken to be from 22nd December 2013 to 19thJune 2014, while the second period consisted of data from 22ndJune 2014 to 19th December 2014. The third period was between 22nd December 2014 and 19th June 2015, while the second period consisted of data from 22nd June 2015 to 19th December 2015. The periods are broken down to reflect the semi-annual changes in the FTSE-15 market.

3.3 Data Collection

The research was based on the secondary data that was obtained from the appropriate source. The data is classified as secondary because it is historical data that was obtained from an already existing source and which further reflects to past information. Data regarding the stock daily prices were obtained from the NSE while data regarding the constituents of the FTSE NSE

Kenya 15 Index and the performance of the index were obtained from the FTSE Russell LTD. The risk free rate used for this study was based on the 91-day T-bill rate of which the necessary data was obtained from the Central Bank of Kenya website. The data was used to compute the expected return, security and portfolio betas, variance and the standard deviation of returns for the portfolio and securities involved.

3.4 Data Analysis

The data collected was analyzed using the basic Statistical measures which are; the mean, the variance and the standard deviation. The statistical measures helped in determining the optimal portfolios among the large cap securities in the NSE over the various periods. From the data collected, the data returns were used to determine the individual asset return and from which the risk of the individual assets was be derived from. To determine the degree of relationship among the variables under study the correlation coefficient was used. The Stata analysis program was used to calculate the correlation coefficient.

3.4.1 The Sharpe Single Index Model

Given the use of basic statistical measures, the SIM is better adapted in carrying out the data analysis since it uses, mean, standard deviation and the variance as the statistical measures. The single index model is based on the notion that stocks fluctuate together due to the common movement in the securities market and that there are no special effects outside the market that account for the stocks co-movement. Sharpe's Model proposes that the relationship between each pair of securities can indirectly be measured by comparing each security to a common factor 'market performance index' that is shared amongst all the securities and this has helped to reduce the burden of large input requirements and difficult calculations required in Markowitz's mean-variance approach (Nalini, 2014).The expected return, standard deviation and co-variance of the single index model represent the joint movement of securities.

According to Sharpe, efficient portfolios created using the Single Index Model have considerable similarity to those constructed using the Markowitz model. However, according to Benari (1988) the SIM performs better as compared to the Markowitz portfolio construction model. This was attributed to the simplicity of application of SIM. It has fewer input requirements thus

performing better. As per Sinaee and Moradi (2010), the Model further represents a better practical improvement in portfolio evaluation, analysis and construction.

3.6.1 Estimating Stock Return.

The equation to be used is;

$$R_i = \frac{(P_t - P_o)}{P_o} \times 100 \quad \text{.....(i)}$$

Where:

Ri is the expected return on security I; Po is the price at beginning of the month and Pt is the price at end of the month.

3.6.2 Excess Return

The excess return is the difference between the expected return on the stock and the riskless rate of interest such as the rate offered on the government security or Treasury bill. The excess return to beta ratio measures the additional return on a security (excess of the riskless assets return) per unit of systematic risk or non-diversifiable risk. This ratio provides a relationship between potential risk and reward. The securities are ranked based on this ratio.

Excess return = $\frac{Ri - Rf}{\beta i}$

Where;

Ri is the return of the stock i; Rf is the Risk Free of return and it is given by the rate of return of the Government securities and βi is the Systematic risk of stock i.

Where βi is given by;

$$\beta = \frac{\sum(R_m - \overline{R_m})(R_i - \overline{R_i})}{(R_m - \overline{R_m})^2}$$

β is the beta; Rm is the return of the market index,$\overline{R_m}$ is the mean return of market index, Ri is the return of individual stock while $\overline{R_i}$is the mean of individual stock.

After computing the excess return of each stock, the ranking of the stocks is done on the basis of their excess return to beta. Stocks with higher ratios rank higher.

3.6.3 Cut–Off Rate

This ranking represents the attractiveness of any stock for inclusion in the portfolio. The choices of the stocks depend on the cut-off rate such that the stocks with higher ratios of (Ri - Rf) /βi are included while those with lower ratios are left out. The cutoff point is denoted by C* is given by;

$$C^* = \frac{\sigma^2 m \sum_{i=1}^{n} \frac{(Ri - Rf)\beta_i}{\sigma^2_{ei}}}{1 + \sigma^2_m \sum_{i=1}^{n} \frac{\beta_i^2}{\sigma^2_{ei}}}$$

Where;

C^* is the cut off rate, σ^2_{ei} represents the unsystematic Risk of the individual securities; $\sigma^2_m i$s the Variance of the market index; Ri - return of the stock I; Rf - Risk free return while βi is the Systematic risk of stock i.

The systematic risk is calculated as

Systematic risk $=\beta^2\sigma^2_m$

While unsystematic risk is computed as

$$\sigma^2_{ei} = \sigma^2 - \beta^2\sigma^2 m$$

Where,

σ^2_{ei} = unsystematic risk of individual security, σ^2 = individual security risk, β = beta value of individual security $\sigma^2 m$ is the expected variance of market index

3.6.4 The Index Return;

The rate of return of the FTSE Kenya 15 Index will be computed using monthly closing points as:

$$R_m = \frac{P_t - P_o}{P_o} \times 100$$

Where R_m is the return of the index; P_t is the index price at current period while P_o is the index price at end of previous period.

The variance of the Index movement is computed as under:

$$\sigma 2 = \frac{\sum (R_m - \overline{R_m})2}{N-1}$$

The variance of the Stock price movement is computed as under:

$$\sigma 2 = \frac{\sum (R_i - \overline{R_i})2}{N-1}$$

3.6.5 Computation of Weight for Each Security to be Included in Forming the Optimal Portfolio

After determining the securities to be selected, the portfolio manager should find out how much should be invested in each security. The percentage of funds to be invested in each security is estimated as follows;

$$X_i = \frac{z_i}{\sum_{i=1}^{N} Z_i}$$

Z_i is computed as;

$$Z_i = \frac{\beta^2 i}{\sigma^2_{ei}} [\frac{Ri - Rf}{\beta_i} - C^*]$$

Where;

The first expression (X_i) indicates the weights on each security and they sum up to one. The second (Z_i) shows the relative investment in each security. The residual variance or the unsystematic risk has a role in determining the amount to be invested in each security.

3.6.6 The Beta of portfolio is given by;

$$\beta_p = \sum_{i=1}^{n} X_i \beta_i$$

3.6.7 The portfolio return is given by;

$$R_p = \sum_{t=1}^{n} X_I \; R_I$$

3.6.8 The portfolio unsystematic risk is given by;

$$\sigma_p = \sqrt{\beta_p^2 + \sum_{i=1}^{n} X_i \, \sigma_{ep}^2}$$

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1.Introduction

This chapter presents the findings and discussions as per the objectives outlined by the study.The data as to the constituents and performance of the Index was obtained from FTSE RUSSEL Ltd while the historical stock prices pertaining to the below companies for the period under consideration were collected from The NSE LTD.

The companies selected for the study are those which ranked as the 15 most capitalized companies in the NSE. The selection is based on the determined full capitalization of company stocks trading at the NSE. The companies come from different sectors within the Kenyan economy. As seen, a number of them come from the banking industry while the others come from the investment sector, commercial and services sector, Energy and petroleum sector, Insurance sector, Construction and allied sector investments sector and the Telecommunication and Technology sector. These companies are highly capitalized because of the capital intensive nature of their operations. Due to the high capital requirements, such investments can be deemed to be very risky and are expected to yield high returns that will cover the costs incurred in investing in them.

To carry out the data analysis for the construction of an optimal portfolio from the Large Cap Stock in the NSE via the Single Index Model, different statistical measures were computed based on the monthly stock prices and market index data considered for the study. These statistical measures included are the; mean monthly return (R_i), the variance ($\boldsymbol{\sigma}$), standard deviation ($\boldsymbol{\sigma}^2$) of the monthly returns, and the standard deviation of the market return ($\boldsymbol{\sigma}_m$). Moreover, the beta (β) and the systematic risk ($\boldsymbol{\sigma^2 ei}$) of all securities involved were calculated. Under each period, taking into consideration the revision of constituents of the index, 15 securities were sampled along with data for the market index for a two-year period that is 2014 and 2015.

4.2. Optimal Portfolio Construction Under Period 1

4.2.1. Mean Return, Beta Values, Excess Return and Ranking of the Securities for First Period Starting 22nd December 2013 To 19th June 2014

To create an optimal portfolio, the Mean return, beta values and the excess returns of the fifteen companies under consideration needed to be computed. The securities had an average return of 1.169% for the period under investigation. The average beta was 0.622 meaning that the securities reaction to market factors was in the same direction. The average excess return for the period was -7.776 which is an undesirable return based on the model. This is because only securities which have positive excess return desirable for investment purposes. The difference in reaction to market is shown by the different asset Betas whereby some securities have a positive Beta while others are negative.

A beta value which is below 1 is used to indicate an investment with a lower volatility as compared to the market. It can also mean that the security is volatile and its price movement is not correlated to the market. Eabl has the highest value of beta of 3.24034 indicating that the security is highly volatile while Britam has a beta of -1.26493 indicating low volatility as with regard to market conditions.

A risk taking investor would prefer to invest in the highly volatile stocks since they promise higher returns associated to its volatility while a risk averse investor would always prefer the securities with the lowest volatility since they are sure of a particular return. Ranking of securities is based on the excess returns. A stock's Excess return is determined by the ratio of its difference between its expected mean return and the rate of a risk free security to its beta. During this period, the risk free rate of interest was taken be 9.047%.

The excess return to beta ratio is used to measure any additional return to a stock per a unit change of systematic risk. As per the table below, NIC Bank was ranked as the stock yielding the highest level excess return for the period with 44.62 while Nation Media Group ranked as the last with an excess return of -44.45.

This is as presented by table 4.2 (a) below. Excess return represents the relation between the potential reward and risk an investor faces when investing in the stock. The security that yields

the highest amount of excess return ranks as the first security for consideration for creating the optimal portfolio. After computation of the excess returns, only three securities had positive excess returns. These securities are NIC bank, Britam and CFC Stanbic. Securities with a high excess returns are those ones whose performance is above average and perform better with regards to the prevailing market conditions.

Table 4.2(a): Table Showing the Mean Return, Beta and Excess Return by Securities Under Period 1

Security	Mean Return	Beta Values	Excess Return	Ranking
Safaricom Ltd.	4.38144	0.89917	-5.18855	5
Barclays	-0.29497	0.82768	-11.27021	9
Equity	5.80484	0.21874	-14.82081	12
KCB	1.93958	0.61950	-11.27071	10
East	0.22586	3.24034	-2.72223	4
KQs	-0.21044	1.50281	-6.15996	6
Coop	0.78523	1.17721	-7.01792	7
CFC	8.75769	-0.40663	0.71099	3
KENGEN	-7.20327	0.5390	-17.03537	13
NIC	-0.50048	-0.21397	44.62077	1
KPLC	-1.48898	0.40308	-26.13343	14
Britam	4.20892	-1.26493	3.82461	2
Scan	-1.84491	1.11110	-9.80263	8
NMG	0.04083	0.21722	-41.45956	15
Centum	2.94686	0.47201	-12.92343	11

The various securities under consideration have different mean returns. However, their ranking is not based on the level of mean return but they are rather ranked based on the level of excess return. Excess return indicates the performance of the stock in consideration to risk. A naïve investor would select securities with the highest expected return. However, given their different

beta aspect, by considering the expected return and beta value, an investor is able to come up with an excess return for each security.

For this period, NIC ha the highest excess return despite having a negative, expected return. Similarly, Britam and CFC do not have the highest return but they have a complementary beta attribute that makes the combination reap optimal results for the investor. Thus, during this period, only three stocks provided a positive excess return. Despite that 9 securities were having positive mean returns, not all of them were suitable enough for consideration in making up the optimal portfolio.

The model thus simplifies the portfolio creation process for investors and analysts. In agreement with literature review, investors need to consider both risk and return in coming up with an optimal portfolio that will serve their investment desires. In similarity to the work of Poornima, and Remesh(2015), it can be seen that the Single Index Model considers both security returns and risk in terms of beta in analysis of the stocks available for selection. The model analyzes securities by considering the risk and return just like the Mean-Variance model of investment analysis providing a platform for further analysis.Investors as such are able to get a simplified but better review of securities. This is because the Sharpe model calls for analysis of both return and risk in portfolio selection. Similar to the findings by Shah, (2015), the data analysis imply that SIM gives the exact number of assets alongside the desirable weightage to be attributed for investment purpose.

4.2.2. Cut-Off Point for Period 1

The Single Index Model uses σei2 as the standard measure of unsystematic risk. This unsystematic risk is the unique or firm specific risk. It only affects the individual firm due to some specific firm related factors. Such risk is a controllable or avoidable. The table below lists all the securities considered for creating the optimal portfolio. The ranking has been made depending on their excess returns. To determine the cut-off point, a ratio of the stock's excess return to its specific risk then is determined in order to compute the stock's 'Ci' value.

To compute the Ci, β2/ σ 2eiand the cumulative values are important. As noted, the Ci value starts at 0.12466 and increases to 0.21412 then starts to decline. As such, the value 0.21412 is

considered to be the 'cut-off point' as shown by table 4.2 (b) below. All other securities that come after this attained cut-off point are not considered for selection to make up or construct the optimal portfolio. Such stocks do not yield the desired contribution towards investor objective of maximizing returns.

The Ci as such is the benchmark since the cumulative ratios after it are lower than it. This means that the securities coming after it do not meet the predetermined standards for consideration as a component of the optimal portfolio. Moreover, it can be noted that securities whose excess return is greater than its specific cut-off point are desirable securities. These securities are the ones adapted for the construction of the optimal portfolio.

Table 4.2 (b): Table Showing the Cut-Off Point Under Period 1

	Securities	**Ri-Rf/Bi**	**(Ri-Rf)*βi**	**(Ri-Rf) βi/σ 2ei**	**Σ(Ri-Rf)βi/σ 2ei**	**βi2/σ 2ei**	**Σ βi2/σ 2ei**	**C**
1	NIC	44.62077	2.04279	0.12466	0.12466	0.00279	0.00279	2.05678
2	Britam	3.82461	6.11961	0.08730	0.21196	0.02283	0.02562	0.78569
3	CFC	0.71099	0.11756	0.00216	**0.21412**	0.00304	0.02866	5.19924
4	EABL	-2.72223	-28.58290	-1.13238	-0.91826	0.41598	0.44464	1.06719
5	Saf	-5.18855	-4.19495	-0.13013	-1.04839	0.02508	0.46972	-1.98735
6	KQ	-6.15996	-13.91189	-3.45306	-4.50145	0.56057	1.03028	0.77708
7	Coop	-7.01792	-9.72562	-0.09788	-4.59934	0.01395	1.04423	-4.17346
8	Scan	-9.80263	10.05192	0.23835	-4.36098	0.02927	1.07350	-0.05539
9	Barclays	-11.27071	7.70985	2.15669	-2.20429	0.19135	1.26486	-1.66654
10	KCB	-11.47260	-4.40290	-0.50097	-2.70526	0.04367	1.30852	0.18923
11	Centum	-12.92343	-2.87921	-0.04584	-2.75110	0.00355	1.31207	-2.00827
12	Equity	-14.82081	-0.70916	-0.00944	-2.76054	0.00064	1.31271	0.00349
13	KENGEN	-17.03537	-15.50098	-0.51579	-3.27633	0.03028	1.34299	-2.33890
14	KPLC	-26.13343	-4.24593	-0.14233	-3.41866	0.00545	1.34843	0.04235
15	NMG	-41.45956	-1.95631	-0.21752	-3.63617	0.00525	1.35368	-2.57612

C = Cutoff points.

The cut-off point is attained under security 3 (CFC). At this point, all other securities coming after it do not meet the requirements to be included in making the optimal portfolio. This creates an evaluation criterion which guides investors in the actual selection of stocks to constitute a desired optimal portfolio. However, securities having a higher excess return as compared to the individual cut-off are the ones to be selected. As a result, during the period under consideration, only NIC and Britam meet selection criteria. In agreement to literature, the combination of stocks making up the optimal portfolio is composed of more complementary securities. Moreover, these securities have different attitude towards risk thus they meet the goals for portfolio creation.The resulting cut-off point used as a selection criterion is a variable of security return and risk.

In agreement to Zayimtsyan (2006), there exists various ways of creating portfolio. However, the Expected portfolio return and standard deviation are used as the quantitative factors of measurements for investment decision making and it can be seen that SIM takes this into consideration.

4.2.3. Proportion of Securities to be Included in the Optimal Portfolio for Period 1

To attain an optimal portfolio for investment purposes, the ratio of funds to be invested into each security considered depends on the overall asset's contribution to such a portfolio. As such funds are often distributed accordingly via appropriation in order to ensure that each security contributes optimally in order to achieve the goal of portfolio creation. By combining the securities, individuals are able to create a portfolio that will give maximum satisfaction from the investment avenue.

Those securities whose excess returns to beta ratio are greater than their cut off points are the ones to be selected to constitute the optimal portfolio. As per the table, the securities with a higher excess ratio to the cut-off points are NIC bank and Britam. Even though CFC Stanbic promised a positive excess return, it is not considered for inclusion as a constituent of the optimal portfolio. Thus the two securities, NIC Bank and Britam when combined provide investors with the highest returns for the period as shown by table 4.3 (c).

Thus, investors should have only considered them for their investment purpose. From the computations, CFC Stanbic delivers a positive excess return. However, due to it has a negative contribution towards the optimal portfolio thus not selected as part of the securities making the optimal portfolio. Moreover, the table indicates the proportion of investment to be appropriated to the two securities for the period 22nd December 2013 to 19th June 2014.

During this period, the optimal portfolio consists of securities from the banking industry and the insurance sector. Thus, no one particular industry dominated the market's performance.

Table 4.2 (c): Table Showing the Proportion of Investment to be Apportioned to the Securities Making the Optimal Portfolio Under Period 1

	Securities	**βi^2/σ 2ei**	**[(Ri-Rf)/βi]-C**	**Zi**	**ΣZi**	**Xi**
1	NIC Bank	0.00279	42.56399	0.11891	0.11891	0.63158
2	Britam	0.02283	3.03892	0.06937	0.18828	0.36842

By allocating appropriate proportion of funds for investment to the selected stocks, as per theory, it will result to attaining the optimal results. The single index model as such is able to appropriately allocate resources or investment purposes. Unlike the Markowitz model, SIM meets investors' requirements with regards to effective allocation of resources.

4.2.4. Portfolio Return Under Period 1

The aim of an investor is to maximize returns. By constructing an optimal portfolio, the investor would yield the highest possible returns promised by the securities market. However, during adverse periods, an investor having an optimal portfolio would yield the minimum losses. The optimal portfolio return is determined by combining the securities which meet the selection criteria and the investment is appropriated based on the recommended proportion to be invested in each of the security.

Funds are appropriated for investment based on the proposed proportion allocation in order to attain the goal of portfolio creation. Figure 4.2 below shows the proportion to be attributed towards the securities making up the optimal portfolio. 36.842% of the investment is to be invested in Britam while 63.158%% is to be apportioned to NIC Bank in order to yield the most

desirable returns over the period under consideration. The appropriation enables for maximum contribution of the selected securities that caters for maximizing returns or minimizing risk.

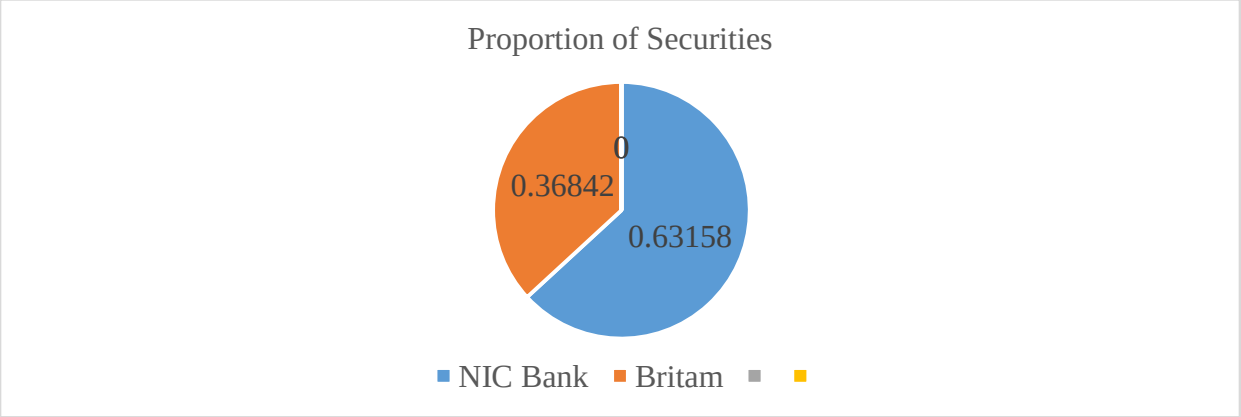

Figure 4.2 Proportion of securities making the optimal portfolio

The computation for portfolio return for the first period starting 22nd December 2013 to 19th June 2014 is as shown by table 4.2 (d) below. The optimal portfolio for the period under consideration having been constituted by Britam and NIC bank promises a return of 1.234%. The portfolio return computed from investing in the optimal portfolio is the highest possible return that an investor who takes into account the risk return relationship in investment would yield. The optimal portfolio yields a higher return than the average return of the securities considered for investment.

Despite NIC having an individual negative return, it has been included in creating the optimal portfolio. Despite the negative returns, NIC has a desirable excess return meaning that it has performed well despite the market situation and this contributes towards its inclusion to the optimal portfolio. On the other hand, Britam yielded a positive expected return and plays a significant role to earning the positive portfolio return.

Despite the differentials between the two securities, their combination as per the model yields the best investment outcome for investors interested in the Large Cap stocks. As put forward by Markowitz (1952), an investor reaps best when combining securities with different attitudes towards the securities market. In agreement to the literature, the two securities combined during

this period tend to cater for the shortcomings of each other that they yield a desired return with the lowest level risk possible.

Table 4.2 (d): Table showing the return earned under period 1

S. No.	Company	Xi	Ri	Xi*Ri
1.	NIC Bank	0.63158	-0.50048	-0.31609
2.	Britam	0.36842	4.20892	1.55064
			∑	1.23455

4.2.5. Portfolio Beta Under Period 1

Portfolio beta represents the risk attribute of the portfolio. It relates the performance of the optimal portfolio to the changing market factors. By creating a portfolio, the aim is to combine securities with different reactions to the market in order to minimize risk. This involves combining the volatile and less volatile stocks in order to reap maximum returns at a given level of risk or to yield the lowest level risk at a given rate of return. The table below shows the computed portfolio beta. The portfolio yields a beta of -0.6011. This means that for every unit change in market variables, the portfolio reacts by 0.6011 units in the opposite direction. The portfolio performance does not move together with market effects. This negative relationship between the portfolio and the market is what shields the investor from risk and loss thus allowing them to get a positive return. The portfolio yields a variance in return of 16.412 and a standard deviation of 4.05127.

The average risk during the period under study was 0.622. However, after creating the optimal portfolio, the investor faces a risk of -0.6011as represented below by table 4.2 (e). This means that the portfolio has an inverse relation to the market factors. The risk as such is reduced by creating the combination of the individual securities into a desirable portfolio. This reduction of risk attained by combining securities makes up for the benefit of diversification. Diversification therefore is important because it allows investors to insulate their investments from the various management and market risks.

The diversification eliminates the unsystematic risk which is a unique risk facing an individual company. By diversification bad thing that occur to one company are offset by good thing that occur to the another companies that constitute the portfolio selected as the best combination.

Table 4.2 (e): Table showing portfolio Beta under period 1

S. No.	Company	Xi	Xi2	βi	Xi.βi	σei2	Xi2* σei2
1	NIC Bank	0.631582	0.398896	-0.213965	-0.135137	16.386936	6.536687
2	Britam	0.368418	0.135732	-1.264935	-0.466024	70.099508	9.514717
				$\mathbf{B_p}$	**-0.601161**		16.051404

$\boldsymbol{\sigma}^2_p = -0.601161^2+16.051504$

$\boldsymbol{\sigma}^2_p=16.41280$

$\boldsymbol{\sigma}_p = 4.051$

4.3. Optimal Portfolio Construction Under Period 2

4.3.1. Mean return, Beta Values, Excess Return and Ranking of the Securities the Second Period starting 22nd June 2014 to 19th December 2014.

During the second period of analysis, each security's monthly mean return, beta and their excess returns which are a sign of their desirability to investors was compute to guide in optimal portfolio creation. During this period under analysis, the securities yielded an average mean return of 1.4451. The average beta was 0.9499 which implies that with every unit change in the market, the securities moved by 0.9499 points in the same direction. The average excess return for the period was -6.9202. The negative excess return is undesirable since it condemns the investors to yielding lower returns than what is desired. If an investor decides to create a portfolio consisting of all the securities contained in the index, the investor would yield a return that is lower than the return earned from investing in the riskless assets.

During the period, Centum has the highest beta value of 5.1762 meaning that it is highly volatile while CFC Stanbic is the least volatile security with a beta of -5797.

For this period of study, the risk free rate of interest was as 8.8801% as represented by the rate of return of 91-Day T-bill. As a result, Eabl was the security yielding the highest level of excess return of 38.56252 while Co-operative bank yielded the lowest return level of -58.9461 during the period. Table 4.3 (a) below shows the computed expected return, the asset's Beta and the excess securities making up the FTSE NSE Kenya 15 Index for the period starting 22nd June 2014 to 19th December 2014.return for the

Table 4.3 (a):Table showing the mean return, beta and excess return by securities under period 2

Security	Mean Return	Beta Values	Excess Return	Ranking
Safaricom Ltd	1.07543	0.22217	-35.13228	14
Co-operative Bank	0.73340	0.13822	-58.94613	15
Britam	8.26919	4.44985	-0.13745	5
KCB Group Ltd	1.19481	1.05765	-7.26705	8
EABL	0.28163	-0.22299	38.56252	1
KQ	-5..68356	-0.69485	20.96047	2
Barclays Bank	-0.77311	0.42027	-22.97062	12
CFC Stanbic	-1.38080	-0.57971	17.70129	3
Kengen	1.04852	-0.56582	13.84237	4
Equity	1.91884	2.42248	-2.87390	7
KPLC	2.13164	0.41308	-16.34074	11
KenolKobil	-0.16483	0.79871	-11.32525	9
CIC	-0.99567	0.86275	-11.44768	10
Kenya-Re	-1.03108	0.35094	-28.24379	13
Centum	7.92405	5.17628	-0.18484	6

For the second period under consideration, it can be noted that most of the securities provide a positive expected return. However, there are only four securities whose excess returns are positive. This means that only the four securities have a mean returns outdoing the risk facing the securities. As per SIM, investors need to consider more attributes of a security rather than the

expected return. Thus, the SIM not only considers the mean returns, excess returns makes for a crucial component for security analysis.

The excess return takes into consideration the firm specific risk thus provides a better picture to investors for judgment. By considering the excess returns, only four securities are worth consideration unlike the total of 9 securities which promise positive mean returns over the period.

Similar to Panwar (2014), SIM is a measure of return that is risk-adjusted which evaluates portfolio performance. It generates a ratio that helps to compare security performance and even the portfolio comparisons. Regardless of the presence of securities from different industries with different performance, the model is suitable enough that it allows or combination of securities from different sectors.

4.3.2. Cut-Off Points for Period 2.

Since it is only those securities with a higher excess return to beta ratio are selected to constitute the optimal portfolio table 4.3 (b) below shows that four securities meet this criterion. During the period, the cut-off point was attained at 1.90316. Thus the securities with a higher excess ratio to the cut-off points are Eabl, KQ, CFC Stanbic and Kengen. When the four securities are combined, an investor would expect the portfolio to yield the highest returns at the given level of risk or yield the lowest risk at a given level of return during the period. After ranking, the cumulative excess return to beta ration increases from 0.04979 to 1.90316 and then starts to decline. The highest value 1.90316 makes for the cut off rate implying that all the other assets after it are not worthy enough to be considered for making up the optimal portfolio.

Table 4.3 (b): Table showing the cut-off point under period 2

	Securities	Ri-Rf/Bi	(Ri-Rf)*βi	(Ri-Rf) βi/σ 2ei	Σ(Ri-Rf)βi/σ 2ei	βi2/σ 2ei	Σ βi2/σ 2ei	C
1	EABL	38.56252	1.91756	0.04979	0.04979	0.00129	0.00129	0.91639
2	KQ	20.96047	10.12005	0.13018	0.17997	0.00621	0.00750	2.97270
3	CFC Stanbic	17.70129	5.94876	1.70117	1.88113	0.09610	0.10361	12.00901
4	KENGEN	13.84237	4.43167	0.02203	**1.90316**	0.00159	0.10520	12.02745
5	Britam	-0.13745	-2.72163	-0.01968	1.88348	0.14321	0.24841	6.24806
6	Centum	-0.18484	-4.95247	-0.13836	1.74512	0.74855	0.99697	1.66201
7	Equity Bank	-2.87390	-16.86520	-0.46587	1.27925	0.16210	1.15907	1.05539
8	KCB	-7.26705	-8.12910	-0.73851	0.54074	0.10162	1.26069	0.41160
9	KenolKobil	-11.32525	-7.22488	-0.16156	0.37918	0.01427	1.27496	0.28553
10	CIC	-11.44768	-8.52093	-0.07508	0.30410	0.00656	1.28152	0.22787
11	KPLC	-16.34074	-2.78759	-0.04059	0.26351	0.00248	1.28400	0.19708
12	Barclays Bank	-22.97062	-4.05728	-2.25848	-1.99498	0.09832	1.38232	-1.38988
13	Kenya-Re	-28.24379	-3.47848	-0.11888	-2.11385	0.00421	1.38653	-1.46839
14	Safaricom	-35.13228	-1.73413	-0.03914	-2.15300	0.00111	1.38764	-1.49443
15	Co-operative Bank	-58.94613	-1.12612	-0.02067	-2.17367	0.00035	1.38800	-1.50841

C = Cut-off points.

The cut-off point is the major criteria for selection. During this period, it is noted that the cut-off point starts to increase from the first security and reaches the highest point at the fourth stock. Thus, only four stocks meet the criteria for selection. Furthermore, it can also be seen that the securities meeting the selection criteria also have excess returns which are higher than their individual cutoff. These stocks promise returns that optimize the investment desires of the investors. These four stocks are the ones with a positive excess return and as SIM stipulates, an

investor should only consider those with securities that have positive excess return. This is a critical guiding factor for investment in the securities market.

4.3.3. Proportion of Securities to be Included in The Optimal Portfolio for Period 2

Table 4.3 (c) below shows the securities that are to be considered in creating the optimal portfolio for the period. The table further indicates the proportion of investment to be appropriated to the four securities for the period starting 22nd June 204 to 19th December 2014. 0.06843% of the investment should be channeled to Eabl, 0.15729% should be directed to KQ, and 0.77021 should be directed to CFC Stanbic while 0.00407 of the investment should be channeled to Kengen.

Table 4.3 (c): Table Showing the Proportion of Investment to Be Apportioned to the Securities Making the Optimal Portfolio Under Period 2

	Securities	**βi/σ 2ei**	**[(Ri-Rf)/βi]-C**	**Zi**	**ΣZi**	**Xi**
1	EABL	0.00129	37.64613	0.04860	0.04860	0.06843
2	KQ	0.00621	17.98777	0.11172	0.16032	0.15729
3	CFC Stanbic	0.09610	5.69227	0.54705	0.70737	0.77021
4	KENGEN	0.00159	1.81492	0.00289	0.71026	0.00407

After determination of the specific securities that should constitute the optimal portfolio, the SIM is able to appropriately determine the required proportion of investment to be made to the selected stocks. The model is consistent in its ability to guide the investment procedure for an investor.

4.3.4. Portfolio Return Under Period 2

The portfolio return is based on the allocation of funds to the securities making up the optimal portfolio. The aim is often to minimize risk or maximize returns and as such, by using the single index model, the risk and return for the constructed optimal portfolio can be determined.

Figure 4.3 represents the proportion of investment that should be assigned to the four securities that make up the optimal portfolio. 77.021% should be invested in CFC Stanbic, 15.729% should be invested in KQ, 6.843% should be invested in EABL and the remaining 0.407% should be invested in Kengen.

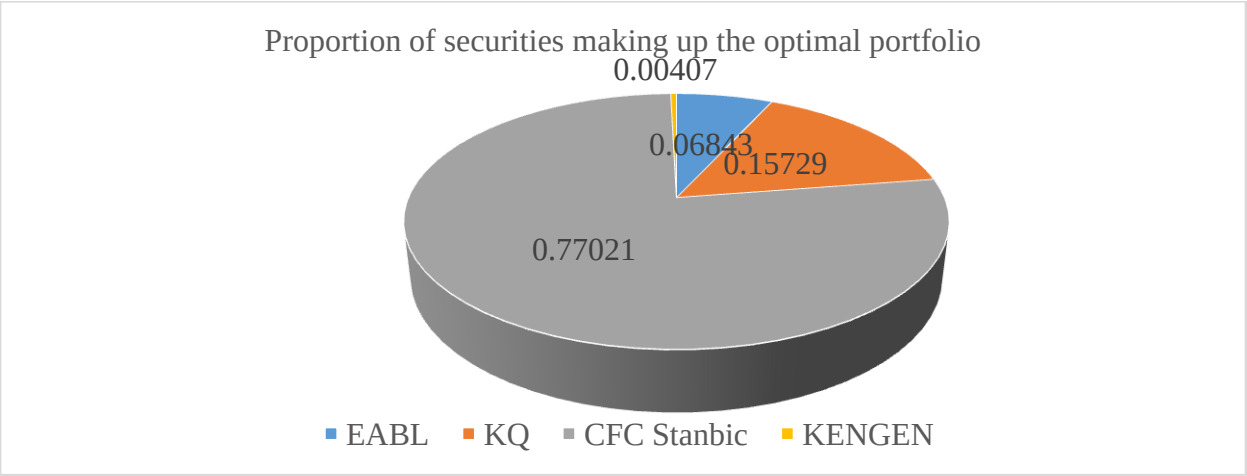

Figure 4.3. Proportion of Securities Making Up the Optimal Portfolio

The return for this period under consideration is negative indicating that the portfolio is a defensive portfolio whose aim is to minimize the risk inherent to investors who chose to invest on large cap stocks. During this period, market factors were unfavorable to the investment in Large Cap stocks in the NSE. This is shown by the negative return that is yielded by the optimal portfolio. The aim of such a portfolio would be to minimize investor losses in the securities market.Table 4.3 (d) shows the calculated return yielded by the optimal portfolio.

Table 4.3 (d): Table showing the return earned under period 2

S. No.	Company	Xi	Ri	Xi*Ri
1.	EABL	0.06843	0.28163	0.01927
2.	KQ	0.15729	-5.68356	-0.89397
3.	CFC Stanbic	0.77021	-1.38080	-1.06351
4.	KENGEN	0.00407	1.04852	0.00426
			∑	**-1.93394**

4.3.5. Portfolio Beta Under Period 2

This is a representation of the risk facing the optimal portfolio during the period under investigation. During this period, the optimal portfolio had a beta of -0.57335. This means that

the portfolio was less volatile with respect to the various market factors. The portfolio is created in order to protect the investors from adverse market factors. The portfolio performance does not move along with market factors. During this period under consideration, the portfolio created reacted to market factors by minimizing the possible losses experienced in the market. This is shown by table 4.3 (e).

Table 4.3 (e): Table showing portfolio Beta under period 2

S. No.	Company	Xi	Xi2	βi	Xi.βi	σei2	Xi2* σei2
1.	EABL	0.06843	0.00468	-0.22299	-0.01526	38.51588	2.63564
2.	KQ	0.15729	0.02474	-0.69485	-0.10929	77.73948	12.22762
3.	CFC Stanbic	0.77021	0.59323	-0.57971	-0.44650	3.49686	2.69333
4.	KENGEN	0.00407	0.00002	-0.56582	-0.00230	201.19909	0.81808
				$\mathbf{B_p}$	**-0.57335**		18.37468

Table 4.3 (e) above shows the Beta computed for the optimal portfolio constructed for the period starting 22nd June 204 to 19th December 2014.

$\boldsymbol{\sigma^2_p}$= -0.57335^2+18.37468

$\boldsymbol{\sigma^2_p}$=18.70342

$\boldsymbol{\sigma_p}$ =4.32474

4.4. Optimal Portfolio Construction Under Period 3

4.4.1. Mean return, Beta Values, Excess Return and ranking for the third period starting 22nd December 2014 to 19th July 2015.

During the third period of analysis, each asset's monthly mean return, beta and their excess returns which are a sign of their desirability to investors was compute to guide in optimal portfolio creation. During the third period, the average mean return by the securities was 0.001233. The average beta was -1.077127 while the average excess return was -8.55158. EABL was ranked as the security with the highest excess return of-3.47937 while Barclays Bank was ranked last with the lowest level of excess return of -18.75927. During the period, no large Cap

stock yielded a positive excess return. This reflects to adverse market factors in the securities market. During the period, the risk free rate of return was taken as 8.44796. Despite the noticed decline in the rate of return over time, the Large Cap stocks have a poor performance that is reflected by their negative excess returns. This is shown by the table 4.4 (a)

Table 4.4 (a): Table showing the mean return, beta and excess return by securities under period 3

Security	Mean Return	Beta Values	Excess Return	Ranking
Safaricom	3.10520	0.66662	-8.01467	9
Co-operative Bank	-2.63965	0.62822	-9.24569	11
BRITAM	-3.80081	1.94878	-6.28536	4
KQ	-1.36182	1.10725	-8.85957	10
CIC Group	-1.75329	1.78986	-5.69946	3
Centum	3.05272	0.84268	-6.40250	6
KENGEN	-0.13983	1.07716	-7.97260	8
CFC Stanbic	-2.46220	0.71671	-15.22255	14
KCB	1.29092	1.11935	-6.39392	5
EABL	2.28455	1.77142	-3.47937	1
Equity Bank	-0.65077	0.91528	-9.94094	12
KenolKobil	-0.27850	1.115029	-7.58629	7
KPLC	3.29103	1.20566	-4.27727	2
Kenya-Re	0.58924	0.77546	-10.13431	13
Barclays Bank	-0.50829	0.47743	-18.75927	15

The third period of study can be seen to be very unfavorable for investment. Despite that some securities have positive mean returns, no security has a positive excess return. All stocks reap a negative excess return to beta ratio which reflects to an unattractive security market. This can be attributed to factors other than individual security risk and return. It can also be noted that all securities have a positive beta. This means that no stock was able to reap returns against market trends. Also, it can be seen that most of the stocks are aggressive and try to reap desirable. This makes all securities to be moving in the same direction to the market factors making it impossible to construct an optimal portfolio. Unlike the reviewed empirical literature, by

applying SIM, this period does not provide an optimal portfolio and this can be attributed to adverse market or external factors which influence the performance of the Large Cap Stocks in the NSE.

4.4.2. Cut-Off Point under Period 3.

The cut-off point is determined as a benchmark for the selection of stocks to the optimal portfolio. The securities which have a higher excess return to beta ratio are the ones to be considered for inclusion into the optimal portfolio. During this period, the adverse conditions facing the securities market made the securities to have negative excess returns that a cut-off rate could not be determined. The risk free rate of return was 8.44796. Despite the decline in the risk free rate of return over the periods, the large Cap stocks during this period faced a challenge from other market factors influencing the stock prices other than the risk free rate of return.

By virtue of having negative excess returns, all securities during the period are viewed to have been out performed by the by the riskless securities. This means that an investors during this period were bound to make losses by investing on the large Cap stocks. The securities could not make excess returns that could beat their cut-off point. As represented by table 4.4 (b), during this period, no security met the criteria for consideration for selection into forming an optimal portfolio to protect investors from excess risk in the market nor creating a portfolio that will yield the highest level of return given the risk level for the period.

During this period, the model implies that the investor would not yield any value by investing in the large cap stocks. This is because of adverse conditions that work against the market's performance. Investors would rather invest in the risk free securities which assure of a positive return. A portfolio manager during this period would not be able to beat the market and yield a desirable return. Thus, investors are better off investing in alternative investments.

Table 4.4 (b): Table showing the cut-off point under period 3

	Securities	Ri-Rf/Bi	(Ri-Rf)*βi	(Ri-Rf) βi/σ 2ei	Σ(Ri-Rf)βi/σ 2ei	βi2/σ 2ei	Σ βi2/σ 2ei	C
1	EABL	-3.47937	-10.91797	-0.62312	-0.62312	0.17909	0.17909	-2.66244
2	KPLC	-4.27727	-6.21749	-0.15943	-0.78256	0.03727	0.21637	-2.88429
3	CIC	-5.69946	-18.25882	-0.19854	-0.98110	0.03484	0.25120	-3.20461
4	Britam	-6.28536	-23.87016	-0.69219	-1.67329	0.11013	0.36133	-4.01963
5	KCB	-6.39392	-8.01123	-0.25849	-1.93178	0.04043	0.40176	-4.22980
6	Centum	-6.40250	-4.54645	-0.08758	-2.01936	0.01368	0.41544	-4.29298
7	KenolKobil	-7.58629	-10.03800	-0.21368	-2.23305	0.02817	0.44360	-4.47905
8	KENGEN	-7.97260	-9.25045	-0.85095	-3.08400	0.10673	0.55034	-5.09509
9	Safaricom	-8.01467	-3.56160	-0.09602	-3.18002	0.01198	0.56232	-5.15176
10	KQ	-8.85957	-10.86190	-0.08697	-3.26699	0.00982	0.57213	-5.20980
11	Co-operative Bank	-9.24569	-3.64888	-0.19046	-3.45744	0.02060	0.59273	-5.33816
12	Equity Bank	-9.94094	-8.32788	-0.21804	-3.67549	0.02193	0.61467	-5.48892
13	Kenya-Re	-10.13431	-6.09410	-2.50057	-6.17606	0.24674	0.86141	-6.73976
14	CFC Stanbic	-15.22255	-7.81943	-0.13398	-6.31004	0.00880	0.87021	-6.82046
15	Barclays Bank	-18.75927	-4.27599	-0.35564	-6.66567	0.01896	0.88917	-7.06019

C = Cut-off points.

As earlier noted, all Large Cap stocks during this period of analysis do not provide a positive excess return. Due to this, by using the SIM, no stocks met the selection criteria for creating an optimal portfolio. This can be attributed to the market factors which were so unfavorable that it largely affected the market for Large Cap stocks. This represents the theoretical knowledge attributing the stock's performance to external factors.

The external market has various risk elements. As a result, during this period, the Single Index Model implies that an investor could not come up with an optimal portfolio. As Nyasha

&Odhiambo (2014) had postulated, it can be seen that the Kenyan Securities market is highly vulnerable to external shocks which affect the performance of the entire security market. This has a negative impact against the investors who are willing to take advantage of stocks trading.

4.5. Optimal Portfolio Construction Under Period 4

4.5.1. Mean return, Beta Values, Excess Return and ranking of the securities for the fourth period starting 22nd June 2015 to 19th December 2015.

During the fourth period of analysis, each asset's monthly mean return, beta and their excess returns which are a sign of their desirability to investors was compute to guide in optimal portfolio creation. The results presented by the table below mean that the securities yielded an average mean return of -2.77634, an average beta of 0.69615 and an average excess return of -20.9074. During the period, ARM was the most volatile security with a Beta of 1.78678 while Kengen was the least volatile security with a Beta of -1.3406.

Unlike the previous period, some securities have been able to yield a positive excess return meaning that investors who chose to invest in the large Cap stocks during this period had the probability of yielding positive returns. Kenya-Re yielded the highest excess returns of 150.29552 hence ranked first while CFC Stanbic yielded the lowest excess return of -332.92580 therefore ranked as the last security that should be considered for creating the optimal portfolio. This is represented by table 4.5 (a) below.

Table 4.5 (a): Table showing the mean return, beta and excess return by securities under period 4

Security	Mean Return	Beta Values	Excess Return	Ranking
Safaricom	0.80205	1.11445	-10.90766	7
Co-op Bank	-2.84166	1.12601	14.03164	10
BRITAM	-5.65983	0.79389	-23.45152	13
ARM	-8.86038	1.78678	-12.21104	9
CIC Group	-3.47601	0.51565	-31.87037	14
Centum	-5.76296	0.86364	-21.67692	12
KENGEN	-4.06419	-1.34062	12.69736	2
CFC Stanbic	-3.40304	0.04914	-332.92580	15
KCB	-5.41563	0.902010	-19.96922	11
EABL	-1.90280	1.55757	-9.54105	5
Equity Bank	-2.40229	1.16434	-13.19234	8
KenolKobil	0.08432	-1.14268	11.26633	4
KPLC	-4.48987	1.52397	11.44899	3
Kenya-Re	3.52458	-0.06277	150.29552	1
Barclays Bank	2.22267	1.59092	-9.54213	6

Unlike the previous period, securities in the period under considerations promised a positive excess return. It can also be noted that most securities during this period have a negative mean return. However, unlike the previous period, some of the securities have the ability to move against the market factors influencing individual security performance. Portfolio creation as known involves combination of complimentary securities that protect investors. Thus, the presence of complementary securities creates an opportunity for investors to create an optimal portfolio constituting of different securities with different dimension to the market risk. Four securities promise a positive excess return meaning that they are able to meet investor requirements.

4.5.2. Cut-Off Point for Period 4

During this period under consideration, four securities, Kenya-Re, Kengen, KPLC and KenolKobil yielded a positive excess return. The risk free rate of return for this period was taken as 12.9581 which mean that the 90-day risk free securities were promising a very high return as compared to the returns expected of the Large Cap stocks in the NSE.

After the ranking of securities based on excess return, the beta ratio initially starts at a high point later starts to increase until a level where it starts to decline to the lowest point. Thus, the cut-off point is selected at 2.54849 as indicated in table 4.5 (b). This means that all other securities after this point are not considered for the creation of an optimal portfolio. Thus, Kenya-Re, Kengen, KPLC and KenolKobil are the securities to be considered when creating the optimal portfolio.

Table 4.5 (b): Table showing the cut-off point under period 4

	Securities	**Ri-Rf/Bi**	**(Ri-Rf)*βi**	**(Ri-Rf) βi/σ 2ei**	**Σ(Ri-Rf)βi/σ 2ei**	**βi2/σ 2ei**	**Σ βi2/σ 2ei**	**C**
1	Kenya-Re	150.29552	0.59211	0.07031	2.61880	0.00047	0.21932	9.35679
2	KENGEN	12.69736	22.82034	0.54969	0.54969	0.04329	0.04329	5.29296
3	KPLC	11.44899	26.59023	1.30749	1.85717	0.11420	0.15749	8.51706
4	KenolKobil	11.26633	14.71054	0.69131	**2.54849**	0.06136	0.21885	9.12081
5	EABL	-9.54105	-23.14693	-0.60723	2.01157	0.06364	0.28296	5.85567
6	Barclays	-9.54213	-24.15136	-0.77235	1.23923	0.08094	0.36391	2.91949
7	Safaricom	-10.90766	-13.54730	-0.95357	0.28565	0.08742	0.45133	0.55804
8	Equity Bank	-13.19234	-17.88473	-0.56892	-0.28326	0.04312	0.49445	-0.51037
9	ARM	-12.21104	-38.98485	-0.40319	-0.68645	0.03302	0.52747	-11.33490
10	Co-op Bank	-14.03164	-17.79066	-2.21718	-2.90363	0.15801	0.68548	-3.89204
11	KCB	-19.96922	-16.90569	-0.65705	-3.56069	0.03290	0.71839	-4.57115
12	Centum	-21.67692	-16.16824	-1.01136	-4.57205	0.04666	0.76504	-5.53782
13	Britam	-23.45152	-14.78058	-0.20395	-4.77600	0.00870	0.77374	-5.72455
14	CIC	-31.87037	-8.47432	-0.19762	-4.97362	0.00620	0.77994	-5.91745
15	CFC	-332.9258	-0.80404	-0.03741	-5.01103	0.00011	0.78005	-5.96115

C = Cut-off points.

As the literature review explains complementary stocks are able to create an optimal portfolio with desirable outcomes. An optimal portfolio is created constituting stocks with different beta ratios representing the difference in risk attributes. By combining these securities, a defensive portfolio that minimizes loss at a particular level of risk is created. Unlike the previous period, the fourth period of analysis has securities yielding positive excess return.

These stocks are the ones to be used to constitute an optimal portfolio.Just like Tapon and Alexeev (2012), the analysis done shows that the optimal portfolio size and constituents do change over time in order to satisfy the investor requirements. However, unlike mean variance optimization as shown by Mbithi (2014), the Single Index Model Gives the exact number of securities to be included in a portfolio, furthermore, it specifies the securities while giving the optimal weightage of each security. CAPM unlike SIM is not capable of this. CAPM model can only suggest the different securities which an investor can select for purpose of investment but does not provide a precise portfolio and weight to invest in for the different securities.

4.5.3. Proportion of Securities to be Included in The Optimal Portfolio for Period 4

The Four securities which had high excess return to beta ratios are the ones considered to create the optimal portfolio. These securities provide a combination of stocks that meet the needs of the investors. During this period, 0.07730% of investment should be directed to Kenya-Re, 0.37580% be channeled to Kengen, 0.39255%, directed towards KPLC while 0.15435 of the funds should be directed to KenolKobil. This combination of securities attains the goal of portfolio creation thus meeting investor requirements as given by table 4.5 (c).

Table 4.5 (c): Table showing the proportion of investment to be apportioned to the securities making the optimal portfolio under period 4

	Securities	βi/σ 2ei	[(Ri-Rf)/βi]-C	Zi	ΣZi	Xi
1	Kenya-Re	0.00047	140.93873	0.06594	0.06594	0.07730
2	KENGEN	0.04329	7.40441	0.32055	0.38648	0.37580
3	KPLC	0.11420	2.93193	0.33483	0.72131	0.39255
4	KenolKobil	0.06136	2.14552	0.13165	0.85296	0.15435

4.5.4. Portfolio Return

The proportion of investment to be committed to the constituent securities of the optimal portfolio for the period under consideration is based on the recommendation of SIM. Figure 4.3 shows that 7.73% of the investment should be committed to Kenya-Re, 15.435% should be committed to KenolKobil, 39.255% should be committed to KPLC and the remaining 37.58% should be committed to KEGEN in order to reap the benefits of portfolio construction during the period.

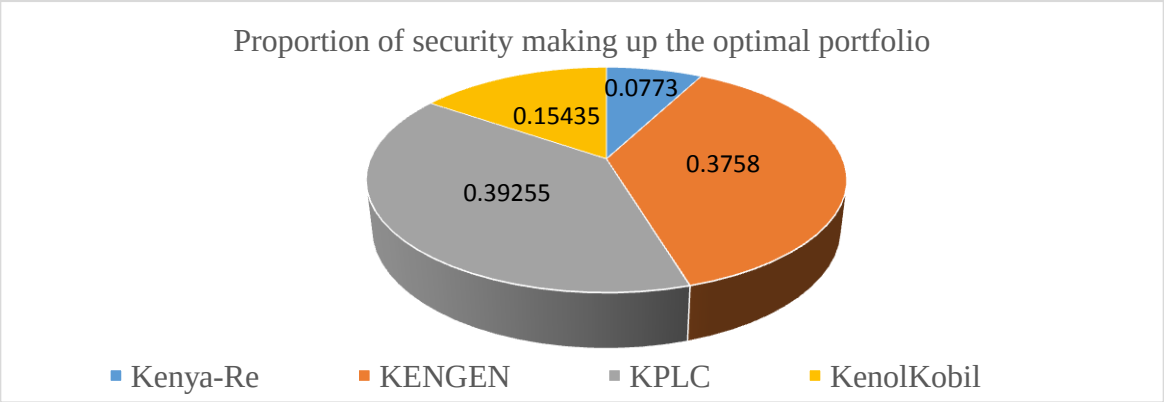

Figure 4.4. Proportion of investment to various securities

Similar to the 2nd period, the optimal portfolio constructed under the 4th period yields a negative return meaning that it is a defensive portfolio. This is because it shields the investor from attaining higher amounts of loses. The optimal portfolio constructed under this period was to shield the investors from excess losses that could be as a result of various market factors which were not favorable to the performance of large cap stocks in the NSE. The negative return can be

attributed to factors in the Kenyan economy such as the increase in base lending rates by the central bank of Kenya.

By increase in the base lending rates, it implies a higher cost of obtaining funds for trading activities from financial institutions. Such increase makes borrowing expensive and therefore companies are forced to limit their budgets with regards to the undertaking of profitable short-term ventures. Moreover, firms with financial obligations are forced to repay their borrowings at a higher interest rate out of their income. With the high financial charges, the performance of the companies declines with respect to profitability.

The reduction in profitability translates to a stagnation or possible decline of the company's share prices. Moreover, over the period, the 364-day T-bill rate reached the highest return rate of 22% making them more attractive as compared to the securities. Table 4.5 (d) shows the computed portfolio return for the period starting 22nd June 2015 to 19th December 2015.

Table 4.5 (d): Table showing the return earned under period 4

S. No.	Company	Xi	Ri	Xi*Ri
1.	Kenya-Re	0.07730	3.52458	0.27246
2.	KENGEN	0.37580	-4.06419	-1.52734
3.	KPLC	0.39255	-4.48987	-1.76249
4.	KenolKobil	0.15435	0.08432	0.01301
			∑	**-3.00436**

4.5.5. Portfolio Beta Under Period 4.

This represents the risk associated to the optimal portfolio created during the period. The computed portfolio Beta for the period starting 22nd June 2015 to 19th December 2015 is –1.283. This indicates that the optimal portfolio is made up of securities which wen combined become less volatile to market conditions. This portfolio yields the lowest level of return at the particular rate of return thus shielding investors from higher losses attributed to investing in the large Cap stocks. The optimal portfolio has a standard deviation of returns of .34678. Just like Sen and

Fattawat (2014), the analysis shows the ability of SIM in constructing an optimal portfolio in a simplified manner.

Table 4.5 (e): Table showing portfolio Beta under period 4

S. No.	Company	Xi	Xi2	βi	Xi.βi	σei2	Xi2* σei2
1.	Kenya Re	0.07730	0.00598	-0.06277	-0.00485	8.42091	0.05032
2.	KENGEN	0.37580	0.14123	-1.34062	-0.50381	41.51527	5.86312
3.	KPLC	0.39255	0.15409	-1.52397	-0.59823	20.33687	3.13381
4.	KenolKobil	0.15435	0.02382	-1.14268	-0.17637	21.27921	0.50692
				$\mathbf{B_p}$	**-1.28326**		9.55417

$\boldsymbol{\sigma^2_p}$= -1.28326^2+9.55417

$\boldsymbol{\sigma^2_p}$=11.20092

$\boldsymbol{\sigma_p}$ =3.34678

Table 4.6: Table showing the relationship between portfolio risk and performance of Large Cap stocks in Kenya

Variables	Statistics	Portfolio Performance	Portfolio Risk
Portfolio Performance	Pearson's Correlation	1	-0.4698
	P-value	.	0.6887
Portfolio Risk	Pearson's Correlation	-0.4698	1
	P-value	0.6887	.

As per theory, there exists an inverse relationship between risk and return. This has an impact on portfolio performance since it implies that during times of high levels of risk, securities that are performing better should yield high levels of return and as such, the performance of the portfolio would be attractive to investors. The higher the portfolio risk, the better the performance of the

portfolio. As per the study, there is an inverse relationship between portfolio risk and performance of the Large Cap stocks in Kenya.

This means, during period with high risk levels, the performance of the Index is poor that it requires investors to constitute a portfolio having many securities in order to yield the optimal portfolio. From the study, the portfolio with more securities normally involves minimizing losses. Such periods involve high risks facing the investors in the securities market thus, by combining many assets, investors are able to minimize risk while attaining a desired return or minimizing their losses.

With a correlation coefficient of -0.6887, P. Value of 0.6887 and at 5% significance level, the first hypothesis that there is no significant relationship between portfolio risk and performance of the Large Cap Stocks in Kenya is accepted. This insignificant relationship is can be attributed to the existence of other factors other than the risk free rate of return which affect the performance of securities. The risk free rate of return is not the only risk factor that contributes to the return earned from the assets invested on.

According to the portfolio theory, risk plays a role in making the choices as whether to undertake the investment opportunities available. Risk can be used as a benchmark of evaluating Investments that should be undertaken and those to be undertaken. Similarly, it determines the securities that can be selected in creating a portfolio. However, in this study, there is no significant relationship between portfolio risk and performance of Large Cap stocks in Kenya. This means that the risk associated with the risk free securities as a single factor does not influence the performance of the Large Cap stocks.

According to the Kenya Economic Update, 2014, there exists various risk factors in the economy which are associated to the fiscal expansion policies. There has been an increase in public investment activities over time which has created a virtuous cycle. The cycle exists between debt sustainability and the country's economic growth. This has made the economy vulnerable to external shocks which have an impact to the securities market. With reference to external borrowings such as the Eurobond which are more attractive to foreign investors, foreign investors would prefer to invest in them while local investors intending to invest in the Kenyan economy only have the option of the risk free assets or the securities market. Issue of external

debt expose the economy to external shocks and the security market being part of the economy react to it.

By investing in the securities market, an investor exposes his or her self to a risky environment. The portfolio theory comes in to guide such an investor into creating an optimal portfolio that provides a desired return that meets the desired investor satisfaction. By applying the SIM, an optimal portfolio is created to meet the needs of the stock holders.

Table 4.7: Table showing the relationship between portfolio return and performance of large cap stocks in Kenya

Variables	Statistics	Portfolio Performance	Portfolio Return
Portfolio Performance	Pearson's Correlation	1	-0.9701
	P-value		0.1561
Portfolio Return	Pearson's Correlation	-0.9701	1
	P-value	0.1561	.

Similarly, with a correlation coefficient of -0.9701, P. Value of 0.1561and at 5% significance level, the hypothesis that there is no significant relationship between portfolio return and performance of the Large Cap Stocks in Kenya is accepted. Just like risk, return also plays a significant role when evaluating the investment alternatives. The promised returns by securities influence the creation of a portfolio. As per the study, there exists a negative relationship between portfolio return and performance of the Large Cap stocks in Kenya. This is shown by the negative correlation coefficient which implies that when portfolio returns are high, fewer securities are required in order to create an optimal portfolio to meet investor requirement. Otherwise, during periods where securities yield lower returns, the Large Cap market performs poorly since many securities are required for creating an optimal portfolio.

Table 4.8: Table showing the relationship between security weights and performance of large cap stocks in Kenya

Variables	Statistics	Security Contribution to Performance	Security Weight
Security Contribution to Performance	Pearson's Correlation	1	0.8961
	P-value	.	0.0004
Security Weight	Pearson's Correlation	0.8961	1
	P-value	0.0004	.

When selecting a portfolio, the amount of investment to be attributed the securities considered depends on the individual security contribution towards the portfolio. This is necessary in order to produce a combination of assets which yield the lowest level risk at a particular level of return or a combination of securities that yield the highest level of return at a given level of risk.

With a correlation coefficient of 0.8961, P. Value of 0.0004and at 5% significance level, the hypothesis that there is no significant relationship between portfolio risk and performance of the Large Cap Stocks in Kenya is rejected. The results show that there exists a significant relationship between security weights and the performance of Large Cap stocks in Kenya. This means that the apportioning of funds to the respective securities plays a big role in creating an optimal portfolio. This is because it allows for the optimal contribution by each security towards the portfolio created.

Thus, with the optimal contribution by each security, it allows for the creation of the optimal portfolio which yields the highest return at a particular level of risk or that yields the lowest level of risk at a given level of return. The performance of the Large Cap Stocks is influenced by the weights attributable to the securities making up the optimal portfolio.

CHAPTER FIVE

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

5.1.Introduction

This chapter gives a summary of the principal findings of this study, the conclusions, recommendations and areas for further research. The study used a descriptive research design and data was obtained from a secondary source. The Single Index Model of portfolio analysis was employed. The summary of the data analysis is providing in the first part while the conclusions drawn from the data analysis are presented. Then, the conclusion ad recommendations to assist both the individual and institutional investors in their quest to making the most reliable and desirable investment decisions based on the available opportunities. This research focused on the NSE in order to determine the influence of portfolio selection to performance of large Cap stocks in Kenya.

5.2.Summary of the findings

Given the large number of securities that an investor has the option to choose from, investors face a rather challenging task of selecting the specific securities to invest in. thus, it is the task of an investor to determine the optimal securities combination for their desired portfolio which would minimize the unsystematic risk and also maximize the attainable returns. From the study it is evident that stock holders have reliable portfolio selection techniques that can be applied to meet their investment needs.

During the first period of analysis, the optimal portfolio was made up of 2 securities. At the prevailing risk free rate of 9.047%, these two securities yield a return of 1.23455% while having a beta of -0.601161.During the second period of analysis, the optimal portfolio was made up of 4 securities. At the prevailing risk free rate of 8.881%, these four securities yield a return of -1.93394% while having a beta of -0.57335.During the third period of analysis, an investor was in no position of creating an optimal portfolio. Regardless of a lower risk free rate of 8.448%, an investor in the large Cap Stocks could not reap the benefits of diversification. This is attributed to external factors other than individual security risk and return. During the Fourth period of

analysis, the optimal portfolio was made up of 4 securities. At the prevailing risk free rate of 12.958%, these four securities yielded a return of -3.00436% while having a beta of -1.28326.

The findings show that portfolio selection is a tool that investors can employ when investing into the securities market. To avoid adverse investments outcomes, both individual and institutional investors can employ the Single Index Model in order to attain favorable outcome in the highly risky but highly rewarding securities market. Securities with Beta values which are greater than 1 are highly sensitive to market forces thus more volatile as compared to those with a lower or negative betas.

From the study, it was noted that the risk free rate of return kept changing from period to period and in response, the optimal portfolio size and constituents kept changing over time in order to guarantee a desirable return. With the change of the risk free rate of return, the portfolios created had different risk levels. The study found out that there is an inverse relationship between portfolio risk and performance of the Large Cap stocks in Kenya with a Pearson's Correlation Coefficient of -0.4698. However, the correlation between the two is insignificant at a P. Value of 0.6887 meaning that there are other factors that need to be considered alongside risk. Thus, an investor should take note of other factors that have an influence towards portfolio creation. This enables the investor to come up with the best combination of securities that would yield the best investment outcome. During periods with high risk levels, the performance of the Large Cap stocks is low that more securities are needed to create an optimal portfolio while when the risk levels are low, the performance of the Large Cap stocks is good that fewer securities are needed to create an optimal portfolio.

Also noted from the study, for an investor to attain a desirable rate of return, the optimal portfolio size kept changing adjusting to the various market factors which influence individual security returns. The portfolio returns vary from period to period same as the securities involved. From the study, there exists an inverse relationship between portfolio return and performance of the Large Cap stockshaving a Pearson's Correlation Coefficient of -0.9701. However, the relationship is at an insignificant level having a P. Value of 0.1561. This means that when securities earn high returns, fewer securities are needed to create an optimal portfolio among the Large Cap stocks. O the other hand, during periods where securities yield lower returns, more

securities are needed to create an optimal portfolio. Thus, it is wise for an investor who wishes to earn a desirable return over the various periods to keep revising their investments in order to maximize returns. Similarly, by having an optimal portfolio, investors are able to minimize the negative returns thus minimizing losses arising from investing in a risky securities market.

The third objective was to determine the relationship between security weights and performance of large cap stocks in Kenya. From the study, the weight of individual securities making up the optimal portfolio varied from period to period responding to the market changes and change in securities making up the optimal portfolio. From analysis, there exists a significant relationship between security weights and performance of Large Cap Stocks in the NSE by having a Pearson's Correlation Coefficient of 0.8961 at a P. Value of 0.0004.

Moreover, from the study, there optimal portfolio size and constituents change over time and it can be seen that construction of an optimal portfolio by using the Sharpe's Single Index Model is more convenient and consumes less time. It is more comfortable and easily applicable for both portfolio managers and security analysts in the real world unlike the Markowitz's Mean-Variance Model which is demanding.

5.3.Conclusions

5.3.1. Theoretical conclusions

The process of constructing an optimal portfolio for both individuals and large investment institutions is a challenge. However, the Sharpe's Single Index Model as applied in this study is a simplified model that can assist to ensure for a rational and optimal decision making while investing in the securities market. Using the SIM, optimal portfolio construction is simplified and it specifies the number and actual securities that are to be considered in making up the optimal portfolio. The challenge facing investors with respect to the difficulty faced when deciding on the proportions attributable to each security for making an investment is catered for when applying the model. As per the study, it also shows that investors can use portfolio construction in either maximizing on returns or mitigating against risk. However, for an investor to make the best decision, all factors that influence security prices should be taken into consideration so as to best analyze all possible scenarios. By using SIM in constructing an

optimal portfolio investors are able to create a good portfolio that would satisfy their investment needs.

Based on the study, there exists an inverse relationship between portfolio risk and performance of the Large Cap stocks in Kenya. However, the relationship is insignificant due to other external factors influencing performance of the Large Cap Stocks.

Secondly, there is an inverse relationship between Portfolio return and performance of large Cap stocks in Kenya, also, the relationship is insignificant due to the presence of other external factors influencing performance of the large Cap Stocks in Kenya.

Thirdly, there is an inverse relationship between portfolio size and Performance of Large Cap Stocks in Kenya. The relationship is at significant level indicating that investors into the securities market need to consider the weights of the securities they choose to include in a portfolio in order to yield optimal returns.

5.4 Recommendations

5.4.1 Limitation of the Study

The major limitation to this study was access to historical information regarding the constituents of the FTSE NSE KENYA 15 Index. The information was not readily available for carrying out the research for a longer period. Moreover, the difficulty in obtaining the data resulted to a delay in the process of data analysis. Similarly, historical asset prices from the NSE are not easily available and one has to buy such data from the Exchange. Due to these factors, the amount of data that could be acquired was limited and as such the study period was limited to the period between December 2013 and December 2015.

Furthermore, the findings of these research may not be universally applicable due to the various differences in economic factors and performance hence creating a difference in securities market performance.With reference to the model used for the study, it results to the creation of a single portfolio which it deems to be optimal and allocates the respective proportions to be invested into each selected security. However, it does create comparable portfolios that show the superiority of the attained optimal portfolio.

5.4.2 Policy recommendations

Given that the Single Index Model of portfolio selection gives the specific securities and the number of securities to consider when creating an optimal portfolio, the model is better suited to aiding both the individual and institutional investors interested in investing in the Securities Exchange. The model is a simple model that can be applied in order to formulate an optimal portfolio and it uses simplified data for analysis.

Also, as from the study, the optimal portfolio size changes over time. This is also true with regards to the constituents of the FTSE NSE KENYA 15 Index. Therefore, investors who are interested with returns should take an active portfolio management strategy in order to take advantage of the periodical variations of security performances which as a results provide different returns over time. Furthermore, from the study, it can be viewed that segmenting the securities market for investment purposes might not be the best alternative as an investment selection criterion. Investors should rather consider all securities available in the securities market in order to create the optimal portfolio that provides maximum utility satisfaction.

Portfolio selection is important to investors since by the creation of portfolios, during the bad economic times, having the optimal portfolio enables the investor to minimize the amount of losses that result from investing in the securities market. The optimal portfolio during the bad economic time provides a defensive portfolio that minimizes loss that is often bound to be incurred given the risky nature of the optimal portfolio. Similarly, the optimal portfolio enables investors to gain the highest level of return at a lower level of risk.

5.4.3 Recommendation for further research

The model can be applied to determine the optimal portfolio in the NSE as an entire capital market as it assures to provide a definite number of stocks and the actual securities to consider for the creation of the optimal portfolio. Moreover, given that the study used the risk free rate derived from the 91 days T-Bill, the studies using a different risk free rate can be conducted.This study only focused on large capitalization stocks in Kenya, the model can be applied in analysis on the various classifications in the Securities exchange in obtaining the optimal portfolios over time. Moreover, the study can be conducted over a longer period in order to come up with more

and comparable findings. More studies should be taken to determine the effect of factors that influence the security prices on the construction of the optimal portfolio while further research on the risk free rate should be done since different government securities have different annual rates of return.

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APPENDICES

Appendix A: Constituents of the FTSE NSE 15 Index for the Year 2014

	Period 1	**Period 2**
	22nd December 2013 – 19th June 2014	22nd June 2014 – 19th December 2014
1	Safaricom Ltd	Safaricom Ltd
2	Barclays Bank Of Kenya Ltd	Barclays Bank Of Kenya Ltd
3	Equity Bank	Equity Bank
4	KCB Group Ltd	KCB Group Ltd
5	East African Breweries Ltd	East African Breweries Ltd
6	Kenya Airways	Athi-River Mining
7	Cooperative Bank Of Kenya	Cooperative Bank Of Kenya
8	CFC Stanbic	CFC Stanbic
9	Kenya Electricity Generating Co	Kenya Electricity Generating Co
10	NIC Bank	Kenolkobil Ltd Group
11	Kenya Power & Lighting Co. Ltd	Kenya Power & Lighting Co. Ltd
12	Britam	Britam
13	ScanGroup	CIC Insurance Group
14	Nation Media Group	Kenya Reinsurance Corp Ltd
15	Centum Investment Co Ltd	Centum Investment Co Ltd

Source. FTSE LTD

Appendix B: Constituents of the FTSE NSE 15 Index For the Year 2015

S/NO	CONSTITUENTS NAME	
	Period 3	**Period 4**
	22nd December 2014 – 19th June 2015	22nd June 2015 – 19th December 2015
1	Safaricom Ltd	Safaricom Ltd
2	Barclays Bank Of Kenya Ltd	Barclays Bank Of Kenya Ltd
3	Equity Bank	Equity Bank
4	KCB Group Ltd	KCB Group Ltd
5	East African Breweries Ltd	East African Breweries Ltd
6	Kenya Airways	Athi-River Mining
7	Cooperative Bank Of Kenya	Cooperative Bank Of Kenya
8	CFC Stanbic	CFC Stanbic
9	Kenya Electricity Generating Co	Kenya Electricity Generating Co
10	Kenolkobil Ltd Group	Kenolkobil Ltd Group
11	Kenya Power & Lighting Co. Ltd	Kenya Power & Lighting Co. Ltd
12	Britam	Britam
13	CIC Insurance Group	CIC Insurance Group
14	Kenya Reinsurance Corp Ltd	Kenya Reinsurance Corp Ltd
15	Centum Investment Co Ltd	Centum Investment Co Ltd

Source. FTSE LTD

Appendix C: Stocks Data for period 1

	December	**January**	**February**	**March**	**April**	**May**	**June**
NIC	59.00	61.00	62.50	64.50	62.00	58.00	57.00
Britam	14.45	17.00	19.50	18.10	18.20	17.65	18.10
CFC Stanbic	82.00	89.00	102.00	107.00	121.00	140.00	134.00
EABL	290.00	289.00	219.00	255.00	284.00	295.00	278.00
Saf	10.00	11.50	11.40	12.30	13.20	13.00	13.70
KQ	12.65	13.40	11.75	12.25	12.60	12.40	12.35
Co-op	17.70	18.55	17.95	20.25	21.00	22.25	17.95
Scan	50.00	55.50	50.00	50.00	46.75	48.00	44.00
Barclays	17.25	17.30	16.00	16.00	16.35	17.00	16.90
KCB	44.50	45.75	44.00	46.50	47.25	46.25	49.75
Centum	33.25	39.50	39.25	38.25	38.00	39.75	39.00
Equity	32.25	32.25	32.00	31.25	32.75	37.28	44.50
KENGEN	14.60	13.25	11.65	11.80	11.80	10.95	9.20
KPLC	14.35	14.55	14.30	14.70	14.85	14.90	13.00
NMG	309.00	314.00	310.00	325.00	310.00	310.00	309.00

Appendix D: Stocks Data for period 2

	July	August	September	October	November	December
EABL	294.00	294.00	271.00	273.00	296.00	280.00
KQ	10.20	9.80	9.55	8.85	7.80	8.50
CFC	128.00	127.00	123.00	126.00	121.00	9.20
KENGEN	9.80	11.40	10.60	12.50	10.60	9.30
Britam	22.50	23.50	34.00	28.25	25.75	26.25
Centum	41.75	47.75	70.50	58.50	62.00	55.50
Equity	46.00	45.75	57.00	50.50	49.00	48.25
KCB	54.00	56.50	59.75	57.00	56.00	53.00
Keno	8.60	8.25	9.35	9.65	9.25	8.75
CIC	10.60	9.00	10.30	10.55	9.75	9.20
KPLC	12.95	14.45	14.30	15.05	16.40	14.50
Barclays	17.00	17.50	17.50	16.95	16.90	16.10
Kenya-Re	18.75	17.55	18.45	17.85	16.75	16.95
Safaricom	12.10	12.75	12.60	12.15	13.70	13.50
Co-op	19.15	19.10	20.00	21.75	19.55	18.75

Appendix E: Stocks Data for period 3

	January	**February**	**March**	**April**	**May**	**June**
EABL	305.00	350.00	350.00	334.00	305.00	315.00
KPLC	15.00	17.60	17.60	17.15	16.25	17.35
CIC	9.95	11.35	11.35	9.15	8.95	7.95
Britam	29.75	29.50	29.50	25.25	22.50	20.25
KCB	59.00	59.00	59.00	64.00	59.00	56.50
Centum	65.00	62.00	62.00	59.50	62.00	65.50
Keno	9.20	10.75	10.75	8.90	8.90	8.45
KENGEN	9.70	10.55	10.55	10.05	9.55	9.15
Saf	14.55	15.15	15.15	17.20	16.60	16.05
KQ	9.35	9.40	9.40	7.05	7.20	7.50
Co-op	19.15	21.50	21.50	21.50	22.00	21.50
Equity	52.00	54.00	54.00	47.00	48.00	45.75
Kenya-Re	17.75	18.50	18.50	17.90	17.20	17.50
CFC	9.95	11.35	11.35	9.15	8.95	7.95
Barclays	16.25	16.90	16.90	15.60	15.30	15.55

Appendix F: Stocks Data for period 4

	July	August	September	October	November	December
Kenya-Re	17.85	17.70	18.40	19.85	20.50	21.50
KENGEN	8.85	8.20	8.25	9.05	7.80	7.00
KPLC	16.00	16.55	15.80	15.95	13.10	12.95
Keno	8.10	8.70	8.70	9.00	8.05	8.40
EABL	285.00	301.00	294.00	253.00	277.00	275.00
Barclays	15.10	14.00	12.90	12.15	13.95	13.35
Saf	15.15	15.00	14.75	14.75	16.50	16.70
Equity	45.00	40.75	44.75	41.25	42.00	39.00
ARM	71.00	60.00	47.25	37.50	41.00	39.75
Co-op	21.00	19.55	18.60	17.00	18.10	17.95
KCB	54.50	46.50	47.75	42.50	41.00	40.00
Centum	56.00	53.00	52.00	47.00	46.50	45.50
Britam	16.90	18.30	17.50	15.00	14.90	13.95
CIC	7.05	7.55	7.05	63.50	6.65	6.35
CFC	106.00	95.00	90.00	90.00	89.50	84.00

Appendix G: FTSE NSE KENYA 15 Index performance

	2014	**2015**
Po	168.472	203.623
January	175.991	220.112
February	165.967	231.923
March	175.184	229.002
April	183.292	230.084
May	189.951	221.675
June	193.549	215.782
July	198.288	205.109
August	203.417	199.663
September	218.272	194.210
October	208.650	180.564
November	211.113	188.068
December	203.623	183.594

Appendix H. NSE Listed Companies used for purpose of this study

1	ARM	Athi River Mining
2	BBK	Barclays Bank of Kenya
3	CFC	CFC Stanbic Bank
4	COOP-Bank	Cooperative Bank
5	EABL	East African Breweries
6	EQTY	Equity Bank
7	ICDC	Centum Investment
8	KCB	Kenya Commercial Bank
9	KENGEN	Kenya Electricity Generating Company
10	KENO	KenolKobil
11	Kenya-Re	Kenya Reinsurance
12	KPLC	Kenya Power and Lighting Company
13	KQ	Kenya Airways
14	NIC	NIC Bank
15	NMG	Nation Media Group
16	SCAN	ScanGroup Ltd
17	SCOM	Safaricom
18	SGL	Standard Group Ltd
19	Britam	Britam Holdings