THE APPLICABILITY OF THE CAPITAL ASSET PRICING MODEL AND FAMA-FRENCH THREE FACTOR MODEL ON STOCKS LISTED IN THE NAIROBI SECURITIES EXCHANGE

BY

CATHRINE WANJIKU KAMAU

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DECLARATION

This Research Project is my original work and has not been presented for an award of a degree in any other university or institution of learning.

Signature: ..... Date: ……

Cathrine Wanjiku Kamau

D61/60682/2013

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

Signature: ..... Date: ……

Mr. Herick Ondigo

Lecturer, Department of Finance & Accounting

School of Business, University of Nairobi

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DEDICATION

I dedicate this project to my parents Mr. & Mrs. Gerald K. Ngahu for their unconditional support and investment in my education.

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LIST OF ABBREVIATIONS

AIMS	Alternative Investment Market Segments
APT	Arbitrage Pricing Theory
BE/ME	Book-to-market equity
BOVESPA	Sao Paulo Stock Exchange
BSE	Budapest Stock Exchange
CAPM	Capital Asset Pricing Model
CMA	Capital Markets Authority
ETF	Exchange Traded Funds
FIMS	Fixed Income Security Market Segment
GNP	Gross National Product
GSE	Ghana Stock Exchange
HML	High Minus Low
IBOVESPA	Bovespa Index
ISE	Istanbul Stock Exchange
JSE	Johannesburg Securities Exchange
KSE	Karachi Stock Exchange
MIMS	Main Investment Market Segments
MRPUR	Mean return to standard deviation of return
NASI	NSE All Share Index
NSE	Nairobi Securities Exchange
NYSE	New York Stock Exchange
OLS	Ordinary Least Squares

REITs	Real Estate Investment Trusts
SMB	Small Minus Big
SML	Security Market Line
SPSS	Statistical Package for the Social Sciences
TARCH	Threshold Autoregressive Conditional Heteroskedasticity
REITs	Real Estate Investment Trusts

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ABSTRACT

In studying risk and return characteristics, the conventional approach of Capital Asset Pricing Model (CAPM) developed by Sharpe (1964), Lintner (1965) and Mossin (1966) is followed. The attraction of CAPM is that it offers powerful and intuitively pleasing predictions about how to measure risk and the relation between expected return and risk. Fama & French (1993) developed a three factor model in response to CAPM anomalies. This study tests the applicability of CAPM and Fama-French Three Factor Model on stocks listed in the Nairobi Securities Exchange over six year period from 1st January 2008 to 31st December 2013. The entire population of 61stocks listed in the NSE is considered for analysis. Monthly data is analyzed for CAPM and quarterly data analyzed for Fama-French Three Factor Model. For CAPM, the study focuses on calculation of betas, excess returns and testing significance of excess returns at 95% confidence level. The difference between expected returns predicted by CAPM and actual returns are not statistically significant. The research finding reveals the applicability of CAPM and is therefore recommended as a stock valuation model for stocks listed in the NSE. On the other hand, research finding reveals that the Fama-French Three Factor model has very limited potential in explaining variations on the return of portfolios. Statistical results show that there is a positive relationship between average return and the size of the portfolios. In other words, big size portfolio overwhelm small size portfolio on realized excess returns. Moreover low book-to-market equity stocks outperformed high to book-to-market equity stocks. The study recommends that cost of capital estimates would be more accurate using a multiple factor model such as the Carhart four-factor model rather than the Fama-French Three Factor Model.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In studying risk and return characteristics, the conventional approach of Capital Asset Pricing Model (CAPM) developed by Sharpe (1964), Lintner (1965) and Mossin (1966) is followed. The attraction of CAPM is that it offers powerful and intuitively pleasing predictions about how to measure risk and the relation between expected return and risk. The model states that there is a positive linear relationship between the expected rate of return on asset and its systematic risk (beta), which is also the only variable that can affect stock returns. Systematic risk indicates the level of sensitivity of change in return on securities in relation to the changes in return on market portfolio.

However, empirical tests of this traditional model conducted in the 1980s and early 1990s provided results against beta as a useful measure of risk. Firm size, earning/price, cash flow/price, book-to-market equity, past sales growth, long-term past return, and short-term past return were other factors found to have added a more significant explanation of average returns. Basu (1977) found higher returns than predicted by CAPM for stocks with high earnings-price ratio. Banz (1981) found higher average returns on small stocks than predicted by CAPM when stocks are sorted on market capitalization that is size effect.

Stattman (1980) and Rosenberg, Barr, Reid & Lanstein (1985) found that US stocks with high book to market equity ratios had high average returns that were not captured by their beta. Bhandari (1988) found high debt-equity ratios were associated with returns that

were too high relative to their market betas. Chan, Hamao, & Lakonishok (1991) found that book-to-market equity also had a strong role in explaining the cross-section of average returns on Japanese stocks. Fama & French (1992) found that that the relation between beta and average return disappeared during 1963-1990 period, even when beta was used alone to explain average returns.

Fama & French (1993) developed a three factor model in response to CAPM anomalies which says that the expected return on a portfolio in excess of the risk free rate is explained by the sensitivity of its return to three factors that is (i) the excess return on a broad market portfolio (ii) the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks (small minus big-SMB) and (iii) the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (high minus low-HML). Empirical results on the Fama-French Three Factor Model shows the model to be more efficient than CAPM in explaining stock returns.

1.1.1 Risk

According to Ross & Westerfield (1988) there is no universally agreed upon definition of risk. However returns on common stock can be measured by the spread between expected and actual returns. Stock holders risk the failure of dividends or stock price reduction that is capital loss. Brealey & Myers (2003) defines risk as the standard deviation of actual security returns compared to expected returns or risk can be defined as the probability that cash flows or return will vary from expectations. Security risk is measured beta. Beta measures the amount that investors expect the stock price to change for each 1% (one percent) change in the market.

According to Ross & Westerfield (1988) and Brealey & Myers (2003), risk can be classified into two that is systematic risk (non-diversifiable or market) and unsystematic risk (diversifiable, residual, specific or unique) risk. Unique risk is the risk that potentially can be eliminated by diversification as it stems from unique features facing companies or their immediate competitors while market risk cannot be eliminated as it is associated with economy wide factors for example inflation and interest rates. Unsystematic risk can be reduced through diversification as this reduces variability for example by holding a portfolio of stocks, investors risk is reduced as the prices of different stocks do not move in the same direction.

1.1.2 Return

According to Arabi (2014) return refers to asset return which is the rate that the investor should require from certain investment given its risk profile. The relative return philosophy is based largely on three theories that is Harry Markowitz's Modern Portfolio Theory (1952, 1999), Eugene Fama's Efficient Market Hypothesis (1961), and Sharpe's Capital Asset Pricing Model (1964). Ross (1976) introduced a fourth theory known as Arbitrage Pricing Theory (APT).

Brealey & Myers (2003) states that return on assets reflect both cash receipts and capital gains or losses realized over time. Cash receipts could be in the form of dividends or interest. Assets could be either physical or financial. For the purposes of this study emphasis is on financial assets which comprise of treasury bills, bonds (Corporate and Government bonds) and stocks (Corporate stocks and stocks of small firms). Treasury bills offers certain nominal returns although investors cannot lock on real rate of return as there is still some uncertainty about inflation. By switching to long term government

bonds, the investor acquires an asset whose price fluctuates as interest rates vary since bond prices fall when interest rates rise and rise when interest rates fall. An investor who shifts from government to corporate bonds accepts an additional default risk while an investor who shifts from corporate bonds to common stocks has a direct share in the risks of the enterprise.

1.1.3 The Relationship between Risk and Return

According to Brealey & Myers (2003), return as a function of risk can be expressed as Return=f (risk). This relationship is referred to as risk-return tradeoff demonstrated using the equilibrium asset pricing models e.g. CAPM. According to Sharpe (1964), Lintner (1965) and Black (1972), a positively significant relationship exists between beta and stock returns referred to as CAPM. CAPM assumes that there is a normal, stable risk premium on the market portfolio, so that the expected future risk premium can be measured by the average past risk premium. Therefore securities expected returns can be estimated by adding the product of average past risk premium and beta to current risk free rate. The expected risk premium on an investment with a beta of 0.5 is half the expected risk premium on the market and the expected risk premium on an investment with a beta of 2.0 is twice the expected risk premium on the market.

According to CAPM the risk return relationship can therefore be summarized as follows; Expected risk premium on stock = beta x expected risk premium on market. Fama & French (1993) in their Three Factor model stipulates that there is a negative relationship between size and average return and a positive relationship between book-to-market equity and average return.

1.1.4 Nairobi Securities Exchange

Prior to 1954 trading of shares took place on a "gentleman's agreement" as there were no rules and regulations to govern the stock broking activities. In 1954 the Nairobi Stock Exchange (NSE) was constituted as a voluntary association of stockbrokers registered under the Societies Act and in 1991 the NSE was incorporated under the Companies Act of Kenya as a company limited by guarantee and without a share capital. In July 2011, the Nairobi Stock Exchange Limited changed its name to the Nairobi Securities Exchange Limited. The change of name reflected the strategic plan of the Nairobi Securities Exchange to evolve into a full service securities exchange which supports trading, clearing and settlement of equities, debt, derivatives and other associated instruments. In September 2011 the Nairobi Securities Exchange converted from a company limited by guarantee to a company limited by shares and adopted a new Memorandum and Articles of Association reflecting the change.

The NSE has equity listings in the Main and Alternative Investment Market Segment (MIMS and AIMS). There is also a third segment for trading of Government & Corporate bonds and other Fixed Income Security Market Segment (FIMS). The NSE was demutualized in July 2014. The Initial Public Offer that started on 24th July 2014 to 12th August 2014 culminated on 9th September 2014 with the self-listing of the NSE on the Main and Alternative Investment Market Segment (MIMS), making it Africa's second security exchange after Johannesburg Stock Exchange to demutualize and list itself.

Following the demutualization of the NSE, other segments for trade of derivative instruments, Real Estate Investment Trusts (REITs) and Exchange Traded Funds (ETFs) are envisioned to come before the end of the year 2014. Demutualization is the separation of membership, direction and management of an exchange. In the derivatives market NSE plans to start with financial futures and options which will be on indices, interest rates, currencies and single stock futures. ETFs securities will trade like stocks. There are a total of 61 companies listed in the NSE.

The Nairobi Securities Exchange is the leading securities exchange in East Africa and the 9th largest among Africa's 17 exchanges with the listed stocks being the most actively traded securities in the exchange hence selected for this study.

1.2 Research Problem

A positively significant relationship is expected to exist between beta and stock returns referred to as CAPM. CAPM assumes that there is a normal, stable risk premium on the market portfolio, so that the expected future risk premium can be measured by the average past risk premium. The risk return relationship can therefore be summarized as the product of beta and expected risk premium on market. Fama & French (1993) in their Three Factor model stipulates that there is a negative relationship between size and average return and a positive relationship between book-to-market equity and average return.

Risk and return relationship in the Kenya has been studied empirically using CAPM and Fama-French Three Factor Model with a bias on the NSE. Oliech (2002) using Fama-French Three Factor Model found out that the there was no relationship between size and

returns and the ratio of book to market value had no relationship to returns. Were (2012) tested CAPM and found out that the portfolio which had the highest beta also had the highest return and the portfolio which had the lowest beta also had the lowest return. Odera (2013) conducted a similar study using Fama-French Three Factor Model and found small stock firms had higher small minus big (SMB) slopes compared to large stock firm portfolios hence capturing the size effect in portfolio returns. However, big size portfolios and medium size portfolios had insignificant slopes that is size effect was not measured on big size and medium size portfolios. High book-to-market equity stocks outperformed low book-to-market equity stocks.

In testing CAPM, Dzaja & Aljinovic (2013) found their regression model was not statistically significant and concluded that it was not representative making CAPM applicability in these markets questionable. Qamar, Rehman & Shah (2014) showed the partial applicability of the CAPM on the Pakistan Stock Market. Arabi (2014) found out that the correlation coefficient between beta and rate of return of risky asset was positive but not significant .Their results were against the CAPM. Empirical evidence shows mixed results.

This study sought to improve on the scholarly finding by testing the applicability of CAPM and Fama-French Three Factor Model using the entire population of all the 61 stocks listed in the NSE as at 31st December 2013 as the market portfolio and using the NSE All Share Index as a proxy for the market portfolio. NSE 20 Share Index was used as a proxy for the market portfolio by Oliech (2002) in his study on Fama-French Three Factor Model; the same index was used by Otieno (2013) in conducting his study on CAPM and Odera (2013) also used the same index as a proxy for the market portfolio in

her study on the Fama-French Three Factor Model. The reviewed local evidence shows a bias on the NSE 20 Share index as opposed to the NSE All Share Index which was considered for this study. Oliech (2002) and Odera (2013) conducted studies on Fama-French Three Factor Model as a single model of analysis while Otieno (2013) conducted a study on CAPM. This study improves on the previous local studies by analyzing two models (CAPM and Fama-French Three Factor Model) on the same data under analysis for the entire population of stocks listed in the NSE.

1.3 Research Objective

To test the applicability of CAPM and Fama-French Three Factor Model on stocks listed in the Nairobi Securities Exchange.

1.4 Value of the Study

The findings of this study contribute to the existing empirical literature on risk and return as stipulated by CAPM and Fama-French Three Factor Model for stocks listed in the NSE. The findings build on the two models validity in valuation of stocks to investors.

Due to information asymmetry where managers possess superior information compared to the investors, the findings of this study shows applicability of CAPM and therefore the model can be used in stock valuation. Investors will therefore be able to calculate their returns based on CAPM.

This study will form part of MBA projects repository at The University of Nairobi which will be beneficial to the students of finance. The same can also be replicated in different contexts or in the same context but by use of different methodology.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Chapter two examines the main theories behind risk return relationship and empirical studies conducted in this area. It discusses key theoretical considerations from previous studies to inform the objective developed for this study. The chapter is concluded by summarizing the findings leading to the identification of the research gap.

2.2 Theoretical Review

There exist four theories explaining the relationship between risk and return that is Portfolio Theory by Markowitz (1959), Capital Asset Pricing Model (CAPM) by Sharpe (1964) and Lintner (1965), The Fama-French Three Factor Model by Fama & French (1993, 1996) and Arbitrage Pricing Theory (APT) by Ross (1976). CAPM builds on the model of portfolio choice developed by Harry Markowitz in 1959 while APT and Fama-French Three Factor Model build on CAPM. Fama-French Three Factor Model was developed in response to CAPM anomalies. CAPM and APT are used to predict or estimate financial asset prices and help the investors to plan and to take an efficient investment decisions. According to Oduro & Anokye (2012), these models have been commonly used in global investing community for calculating the required return on a risky asset.

2.2.1 Portfolio Theory

Markowitz (1952) wrote an article on portfolio selection which involved two stages. The first stage starts with observation and experience and ends with beliefs about the future

performances of available securities. The second stage starts with the relevant beliefs about future performances and ends with the choice of portfolio. The portfolio with maximum expected return is not necessarily the one with minimum variance and vice versa. There is a rate at which the investor can gain expected return by taking on variance, or reduce variance by giving up expected return. Investors should diversify and maximize expected return through holding a portfolio yielding both maximum expected return and minimum variance and commends this portfolio to the investor. According to Brealey & Myers (2003), the principles in the portfolio theory article forms the foundation of what has been written about the risk and return relationship.

Markowitz further developed a model referred to as the mean variance model in 1959 being an improvement of the 1952 article on portfolio selection. He modelled a one period investment with an assumption that investors are risk averse and when choosing among portfolios they only care about the mean and variance of their one period investment. Investors are expected to choose mean variance efficient portfolios that are portfolios that maximize expected return given variance or those that minimize variance of portfolio return given expected return.

2.2.2 Capital Asset Pricing Model

CAPM developed by Sharpe (1964), Lintner (1965) and Mossin (1966) describes the expected market price or market rate of return of a specific asset in relation to the expected risk. According to the model, risk associated in investing in financial assets can be splits into unsystematic (diversifiable, residual, specific or unique) risk and systematic (non-diversifiable or market) risk. The unsystematic risk is micro in nature and has to do with a specific firm or industry but the systematic risk is macro in nature and affects all

firms operating in an economy. An investor can avoid the unsystematic risk by avoiding the firm or the industry or through efficient diversification but the systematic risk is unavoidable and the investor's expected rate of returns should be above the risk-free rate sufficient to compensate for the systematic risk taken.

The developers of CAPM argue that, an index (known as beta, denoted by β) which measures the systematic risk relative to the market portfolio, is the sole determinant of return of a financial asset and hence it price. Thus, any additional variability or risk caused by events peculiar to the individual asset (known as unsystematic risk) can be diversified away, implying that, the capital markets do not reward risks borne unnecessarily by investors. According to Brealey & Myers (2003) beta is said to be the only factor that can affect stock returns. Ross & Westerfield (1988) on the other hand defines CAPM as the model of SML where the expected returns of individual assets are a linear function of beta.

2.2.3 Fama-French Three Factor Model

Fama & French (1993) developed a three factor model in response to the poor performance of CAPM in explaining realized returns that is due to CAPM anomalies. CAPM anomalies are other factors other than beta which influence stock returns and are not explained by the model. These anomalies include firm size, book-to-market-equity, earnings/price , cash flow/price and past sales growth, long term past return and short term past return. The anomalies largely disappear in the three factor model. The model says that the expected return on a portfolio in excess of the risk free rate is explained by the sensitivity of its return to three factors that is (i) the excess return on a broad market portfolio (ii) the difference between the return on a portfolio of small stocks and the

return on a portfolio of large stocks (small minus big) and (iii) the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (high minus low).

According to Fama & French (1996), weak firms with persistently low earnings tend to have high book-to-market-equity and positive slopes on high minus low; strong firms with persistently high earnings have low book-to-market-equity and negative slopes on high minus low. Using high minus low to explain returns shows that there is covariation in returns related to relative distress that is not captured by the market return and is compensated in average returns. Similarly, using small minus big to explain returns shows that that there is covariation in the returns on small stocks that is not captured by the market return and is compensated in average returns. In summary, there is a negative relationship between size and average return and a positive relationship between book-to-market equity and average return.

2.2.4 Arbitrage Pricing Theory

Ross (1976) introduced the Arbitrage Pricing Theory (APT), a multifactor financial asset pricing model, as an alternative to the CAPM. It postulates that the pricing of risky assets depends on a set of variables whose influence is felt significantly by all risky assets together. It has the potential to overcome CAPM weaknesses as it requires less and more realistic assumptions to be generated by a simple arbitrage argument and its explanatory power is potentially better since it is a multifactor model. Multiple factors expected to have an impact on all assets include inflation, growth in Gross National Product (GNP), major political unrest, changes interest rates etc.

2.3 Determinants of Stock Returns

In addition to risk as a determinant of stock returns other determinants include interest rate, inflation and exchange rate.

2.3.1 Interest Rate

According to Osisanwo & Atanda (2012) the interest rates that applies to investors is the Federal Reserve's federal funds rate. This is the cost that banks are charged for borrowing money from the Federal Reserve banks. Increasing the fund rate does not have a direct impact on the stock market. With the increase it becomes more expensive for banks to borrow from the Federal Reserve. In result banks increase their lending rates; customers borrow fewer funds thereby reducing their disposable income. Customers therefore reduce their investments which will affect businesses revenues and profits. This in return affects stock returns.

On the other hand, companies reduce their borrowing when interest rates increase. If a company is seen as cutting back growth spending or making less profits either through higher debt expenses or less revenue from consumers, then the estimated amount of future cash flows will drop. This will lower the price of the company's stock.

2.3.2 Inflation

According to Gultekin (1983) inflation is the rise in the price of goods and services. It reduces consumer purchasing power. The rate of inflation represents the rate at which real value of an investment is eroded and the loss in spending power over time. Inflation also tells investors exactly how much of a return their investments need to make for them

to maintain their standard of living. Investors should therefore try to buy investment products with returns that are equal to or greater than inflation.

High inflation can be good, as it can stimulate some job growth. But high inflation can also impact corporate profits through higher input costs. Higher input costs causes' reduction in profitability levels hence reducing earnings attributable to stock holders.

2.3.3 Exchange Rate

Research on the link between stock returns and exchange rate movements has a long tradition in the international finance literature of Adler & Dumas (1984). Jorion (1991) reported that this link is small and hardly significant. Bartram (2004) documented that the link between stock returns and exchange rate movements is nonlinear.

According to Baldwin & Lyons (1994) such a nonlinear link is consistent with, for example, models featuring transaction costs in international goods market arbitrage and sunk costs of market entry. Transaction costs and sunk costs of market entry imply that only large exchange rate movements affect market structure and, thereby, firms' market value. Empirical evidence of nonlinear exchange rate dynamics consistent with such models has been reported for example, by Taylor, A. & Taylor, M. (2000).

2.4 Empirical Review

Various studies have been undertaken both locally and internationally to explore the relationship between risk and return. Some of those studies were reviewed and are summarized below.

2.4.1 International Evidence

Andor, Ormos & Szabo (1999) empirically tested CAPM for 17 Hungarian firms listed in the Budapest Stock Exchange (BSE). The data collected covered the period 31st July 1991 to 1st June 1999. They used linear regression where the independent variable was beta and the dependent variable was average monthly return. The discovered a positively correlated relationship between Beta and (ex-post) returns.

Faff (2001) tested the Fama-French Three Factor Model in Australian stock market. He used 24 Australian Industry portfolio data from Datastream International covering a period from January 1991 to April 1999. He used four Australian equity style indexes to construct the SMB and HML factors which includes ASX/Russell Value 100, ASX/Russell Growth 100, ASX/Russell Small Value and the ASX/Russell small Growth index. He found out that the estimated premium for the market and for the book-to-market factor were positive but size risk premium was negative.

Gaunt (2004) tested the validity of the Fama-French model in Australia over a ten year period 1991 to 2000 by selecting a sample of 650 companies from a population of 1310 companies. He used regression analysis and found out negative association between size and returns, positive association between market risk premium and returns and positive association between SMB and returns.

Shum & Tang (2010) examined risk-return characteristics comparing China Stock Market with Brazil, Russia and India. Weekly sectoral index returns and market returns from January 2003 to July 2007 were collected. Brazilian sample included all seven sectoral indexes on the Sao Paulo Stock Exchange (BOVESPA) and the market index, Bovespa

Index (Ibovespa). The sectors considered in Russia were telecommunication, energy, machinery, oil and gas, and petrochemicals. India sampled all the ten sectoral indexes on the Bombay Stock Exchange (BSE).They used a conditional regression model separating periods of negative and positive market excess returns. They found out that significant positive (negative) relation exists between beta and realized returns where market excess returns were positive (negative). The intercept coefficient in the regression model was not significantly different from zero in Brazil, Russia, and India, the coefficient for China was significantly positive, indicating that the Chinese stock market generated positive abnormal risk-adjusted returns. In their findings, beta was still the most important factor explaining returns variations. Other risk measures, including unsystematic risk, skewness, and kurtosis provided limited explanations.

Olakojo & Adije (2010) examined the CAPM for Nigeria Stock Market using monthly stock returns from 10 most listed Companies on the Nigeria Stock Exchange for the period of January 2008 to December 2009. They adopted Michailidis et al. (2006) methodology by estimating beta coefficients for the sample stocks. Monthly stock values were estimated using Ordinary Least Squares (OLS). The beta coefficient was estimated by regressing each stock value against the market value weighted index. They found non-linearity in SML hence not in accordance with CAPM. They also found no effect of residual risk on expected returns of stocks. Although the evidence was against CAPM the findings did not necessarily constitute evidence in support of any alternative model.

Reddy & Thomson (2011) tested empirical validity of CAPM for the South African share market. They used quarterly total returns from ten sectoral indices listed on the Johannesburg Securities Exchange (JSE) from 30 June 1995 to 30 June 2009. Regression

analysis was used to test hypotheses based on both individual sectoral indices and portfolios constructed from those indices according to their betas. It was found that while, on the assumption that the residuals of the return-generating function are normally distributed, the CAPM could be rejected for certain periods, and the use of the CAPM for long-term actuarial modeling in the South African market can be reasonably justified.

Oduro & Anokye (2012) investigated whether CAPM and APT were valid models for determining price/returns of the shares listed on the Ghana Stock Exchange (GSE) and to compare which of the two models had efficiency in explaining the behavior and predicting the prices of the listed shares. Using return data from 2000 to 2009 on 15 companies listed on GSE, analysis was done using simple linear regression of CAPM. The independent variable was the excess return of the return on assets over the risk free rate that is rate of return on individual asset less the risk free rate while the excess return of the market returns over the risk free rate was the dependent variable that is market return less risk free rate. The study found APT to perform better than CAPM in predicting and determining prices/ returns of listed shares on GSE. The APT was a more powerful method that allowed consideration of the risk borne on additional systematic macroeconomic variable, other than the market portfolio.

Dzaja & Aljinovic (2013) examined whether CAPM was adequate for capital asset valuation on the Central and South-East European emerging securities markets. They used monthly stock returns for nine countries for the period of January 2006 to December 2010. The sample constituted of 10 most liquid stocks from each market, taking into account the weight of stocks within each particular stock market index. Cross section testing was done using MS Excel spreadsheet program and regression analysis. Expected

return was the dependent variable of the regression line while beta was the independent variable. They found out cross sectional analysis test results obtained CAPM was not adequate for assessing the capital assets on observed Central and Southeastern European emerging markets. The regression model was not statistically significant that is higher yields did not mean a higher beta therefore beta was not a valid measure of risk in these markets. They concluded that the model was not representative making CAPM applicability in these markets questionable.

Eraslana (2013) tested the validity of the Fama-French Three Factor asset pricing model on the Istanbul Stock Exchange (ISE). Data on all the 365 stocks trading in the ISE was used by taking monthly excess stock returns over the period from 2003 to 2010 for analysis. He used the model's regression equation and found a positive relation between average return and the size of the portfolios. Size factor had no effect on portfolios having big-size firms but could explain the excess return variations on portfolios having small and medium-sized firms. High book-to-market-equity stock portfolios had higher excess returns than low book-to-market-equity stock portfolios. The model had power on explaining variations on excess portfolio returns but the power was not strong throughout the test period on the ISE.

Vedd & Lazarony (2014) examined risk-return trade-off of investing in Latin American emerging stock markets. The study sought to examine whether equities from Latin American emerging markets might have offered the Canadian investor high returns for a relatively low level of risk when combined into a portfolio of Canadian shares. They included all the 204 emerging market firms in the portfolio for ten year period ending 2007. The portfolios constructed were evaluated using the ratio of mean return to

standard deviation of return (MRPUR). They found out that emerging markets recorded the highest MRPUR that is portfolios comprising of emerging market firms had lower standard deviation of return and higher mean return compared to portfolios made up of Canadian companies.

Qamar, Rehman & Shah (2014) examined the applicability of CAPM on Pakistan Stock Markets and Karachi Stock Exchange being the main capital market of Pakistan was taken for the study. A sample 10 performing companies of 100 index of KSE for a period of five years from 2006 to 2010 was analyzed. They used Microsoft Office (MS Excel) for most of their calculations. They observed that the annual expected and actual rate of returns were different from each other with some results showing a very little variation in the actual and required rate of returns. The results having a variation of around 6% were considered as the slightly different and the remaining all as the totally different. This showed the partial applicability of the CAPM on the Pakistan Stock Market.

Arabi (2014) investigated the validity of the Capital Asset Pricing Model, APT, and the Three Factor Model of Fama and French at Khartoum Stock Exchange. He analyzed cross sectional data of seven banks and Telecommunication Company (composed of 97 percent of the KSE) for the period 2005-2011. Stock volatility was measured using Threshold Autoregressive Conditional Heteroskedasticity (TARCH). He also used linear regression where the independent variable was beta and the dependent variable was average monthly return. He found out that the correlation coefficient between beta and rate of return of risky asset was positive but not significant .The results were against the CAPM because the CAPM's prediction that the intercept should equal zero was not been attained, and its main assumption that is the security market is efficient was violated. The

APT showed no reaction to news from macroeconomic variables. Nevertheless APT out-performed Fama-French Model and CAPM.

2.4.2 Local Evidence

Oliech (2002) using Fama-French Three Factor Model conducted a study on the relationship between size, book to market value and returns of common stocks of all companies listed in the Nairobi Stock Exchange for the period 1996 to 2000. Data was analyzed using regression analysis and cross tabulation. He found out that the there was no relationship between size and returns and the ratio of book to market value had no relationship to returns.

Kamau (2002) conducted a study investigating the relationship between Risk and Return of companies listed under the various market segments in the NSE. Companies listed in the Main Investment Market Segment (MIMS) and the Alternative Investment Market Segment (AIMS) were considered for analysis. The study utilized historical market data from the NSE for the period between January 1996 and December 2000. Individual firms Sharpe Ratios for the entire period were computed and analyzed. Differences between Sharpe Ratios of firms listed under the MIMS and those of firms listed under AIMS were analyzed using Wilcoxon Rank Sum Test. The research found out that there was no significant difference in terms of return and risk between those firms listed under the MIMS and AIMS.

Ngatia (2009) conducted a study investigating the relationship between systematic risk and return of stocks listed on the NSE for the period 2001 to 2008. The study sought to establish whether the companies that are classified under MIMS are actually different in

terms of risk and return with those classified under AIMS. He used descriptive design by taking repeated measures over time in conducting trend analysis and tracking changes in relationship over time. Systematic risk was found to have minimal effect on dividends and stronger positive effect on bonuses to investors. MIMS had the highest systematic risk and posted highest returns to investors compared to AIMS. Systematic risk and return relationship was found to be stronger in companies under MIMS compared to those under AIMS.

Otieno (2013) tested the validity of CAPM on the NSE for a four year period 1st Jan, 2009 to 31st Dec, 2012. Monthly returns on the sampled 30 firms out of a population of 60 firms were analyzed and the NSE 20 Share Index was used a proxy for the market index. A simple regression model was employed to analyze the data in three stages i.e. portfolio formation, initial estimation and testing periods. A significance test at 95% confidence level was also conducted to evaluate the data and regression results available within the testing period. He found out that the portfolio with the highest beta did not have the highest return and vice versa. Hence the data analysis revealed inapplicability of CAPM to the NSE, 20- share index, and the results confirmed that the standard CAPM is not verified in the NSE during the period of study.

Odera (2013) conducted a study to test the applicability of the Fama-French Three Factor Model for firms listed at the NSE for the period January 2008 to December 2012. Monthly returns of all the 60 listed companies were analyzed. Standard multivariate regression framework method was used to apply Fama-French Three Factor Model on securities listed at the NSE. Return above risk free rate on each portfolio were regressed on three factors namely value premium, size premium and market risk premium. She

found small stock firms had higher SMB slopes compared to large stock firm portfolios hence capturing the size effect in portfolio returns. However, big size portfolios and medium size portfolios had insignificant slopes i.e. size effect was not measured on big size and medium size portfolios. High book-to-market equity stocks outperformed low book-to-market equity stocks. The model was found to have some power in explaining variations in excess portfolio returns but not strong enough throughout the test period.

2.5 Summary of Literature Review

Literature review shows that there exists a positive relationship between risk and return as stipulated by CAPM. Literature on Fama-French Three Factor Model shows that expected return on a portfolio in excess of the risk free rate is explained by the sensitivity of its return to three factors that is (i) the excess return on a broad market portfolio (ii) the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks (small minus big) and (iii) the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (high minus low).

However empirical review shows lack of full support CAPM on most of the studies but found the Fama-French Three Factor Model to be more efficient in explaining stock returns. These findings were based on a single asset pricing model evaluated in isolation. The proposed study aims to provide empirical evidence on risk return relationship by testing the applicability of CAPM and Fama-French Three Factor Model for stocks listed in the NSE using the same period data and the entire population as the market portfolio.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Chapter three focuses on the methodology used in testing the applicability of CAPM and Fama-French Three Factor Model. It identifies the research design, the population of study, data collection, the source of the data collected and data analysis.

3.2 Research Design

This study used descriptive research design. According to Cooper & Schindler (2011), descriptive research design is a research design concerned with finding out who, what, where, or how of the research. It describes a population with respect to important variables. The design is used for various purposes which are to describe characteristics of certain groups, to determine the proportion of people who behave in a certain way, to make specific predictions and to determine relationships between variables. The design requires a clear specification of who, what, when, where, why and how of the research. The design fitted this study which aimed to determine relationships between variables that is risk and return.

3.3 Population

The population studied comprised of all the 61 stocks listed in the NSE as at 31st December 2013. A census was carried out therefore the research covered all the 61 listed stocks for period of 1st January 2008 to 31st December 2013. The six year period was deemed appropriate as it starts when the NSE All Share Index was introduced. It was introduced as an alternative index in 2008, with a base value of 100 as of January 2008. It

is a market cap weighted index consisting of all the securities on the NSE. It therefore focuses on the overall market capitalization. It was therefore suitable for this study which was based on the entire population.

3.4 Data Collection

For CAPM, this study used secondary data which was the monthly closing prices of the 61 listed stocks in the NSE for the period of 6 years (1st January 2008 to 31st December 2013). The data was obtained from the NSE offices. NSE All Share Index was the proxy of the market index and the existing 91days Treasury bill was used as a proxy for the risk free rate. All stock returns used for the study were adjusted for dividends. For the Fama-French Three Factor Model, the same secondary data was used for analysis.

3.5 Data Analysis

For CAPM, actual rate of return, expected rate of return and betas of corresponding stocks were calculated using Ms Excel spreadsheet program. Actual stock returns were calculated as follows;

$$\frac{P_t - P_{t-1}}{P_{t-1}} + \frac{D}{P_t}$$

Where:

P_t is the price of a stock at time t (month)

P_{t-1} is the price of a stock at time t-1 (previous month)

D is dividends

D/Pt is the dividend yield

The same formula was applied to the stock market index (NASI) to calculate the market return as follows;

$$\frac{N_t - N_{t-1}}{N_{t-1}}$$

Where:

N_t is the closing index value at time t (month)

N_{t-1} is the closing index value at time t-1 (previous month)

Using the entire population, beta (β) was calculated by deriving the slope between the market return and the returns of individual stocks that is stock return was kept on the y-axis and market returns was kept on the x-axis. After calculating the value beta for each security, expected return of each stock in the entire population was calculated using the equations of CAPM as given below.

$$E(R_i) = R_f + \beta_{im} [E(R_m) - R_f)]$$

Where;

R_f represents risk free interest rate

R_m represents market return

β_{im} represents asset market beta

For the Fama-French Three Factor Model, data of the 61 stocks listed in the NSE was sorted according to their market capitalization which was determined by multiplying the total number of shares times the price per share. Then companies were grouped as high market value (big) and low market value (small) stocks. Securities were then divided into three groups based on their book to market ratio. The first group consisted of securities having high book-to-market ratios, second group having medium book-to-market ratios

and last group having low book-to-market ratios. Market risk premium was estimated by deducting the 91day Treasury Bill yield from 3 months NSE All share index yield.

Small Minus Big (SMB) was calculated by deducting the average return of big capitalization portfolios from average return of small capitalization portfolios. High Minus Low (HML) was calculated as the difference between the return of high book-to-market value portfolio and the small book-to-market value portfolio. Standard multivariate regression framework method was used to apply Fama-French Three Factor Model on securities listed at the NSE. Statistical tests were done using SPSS. Return above risk free rate on each portfolio was regressed on three factors namely value premium, size premium and market risk premium. The Fama-French Three Factor Model used is as follows;

$$R_{it} - R_{ft} = \alpha_{it} + b_{it} (R_{Mt} - R_{ft}) + S_{it} (SMB) + h_{it} (HML) + \varepsilon_{it}$$

Where:

Ri is the total return of portfolio i

Rf is the risk free asset return

RM is the total market portfolio return

$R_{it} - R_{ft}$ is the excess portfolio return in month t

RMt-Rft is the excess market portfolio return in month t

ε_{it} is the error term

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the quantitative analysis of secondary data obtained on 61 listed companies at the NSE for the period 1st January 2008 to 31st December 2013 as well as the research findings. Data on monthly stock prices, dividends, NSE All Share Index, market capitalization and book values were collected from NSE offices. 91day Treasury bill rate was used a proxy for the risk free rate. The data was analyzed using Microsoft Excel 2010 and SPSS version 21. The chapter contains three sections namely findings, estimation results and interpretation of findings.

4.2 Findings

Research findings and interpretation on CAPM and Fama-French Three Factor Model applicability on stocks listed in the NSE are analyzed separately.

4.2.1 Capital Asset Pricing Model Summary Statistics

Beta values of the individual stocks were estimated using CAPM equation. A detailed table containing stocks, betas, average excess returns and their significance values are included in Appendix II. The results in appendix show negative and positive betas ranging from -8.18 to 6.53. 28 stocks have negative beta, 31 stocks have positive beta while the rest 2 stocks have zero beta. 19 stocks have an absolute beta score below 1.0 including 2 stocks with zero betas while 42 stocks have an absolute beta above 1.0. Positive and negative average excess returns are also observed ranging from -0.77 to 2.72. 20 stocks have negative excess returns while the rest 41 stocks have positive

average excess return. Significance values range from 0.000 to 0.962. 4 stocks have a significance value less than 0.05 while the rest 57 stocks have significance values above 0.05.

4.2.2 Fama-French Three Factor Model Summary Statistics

Total return of portfolio (Ri), risk free asset return (Rf), excess portfolio return (Ri-Rf), total market portfolio return (Rm) and excess market portfolio return (Rm-Rf) are included in Appendix III. SMB (Small Minus Big) which is quarterly average return for the smallest 50% of stocks minus the average return of the largest 50% of stocks in that quarter and HML (High Minus Low) which is average return for the 30% of stocks with the highest B/M (book-market) ratio minus the average return of 30% stocks with the lowest B/M ratio are also included in Appendix III.

The coefficients of the regression model are presented on the tables below. α is a constant, b is a measure of the exposure an asset has to market risk (this beta have a different value from the beta in CAPM model as a result of the added factors), s measures the level of exposure to size risk and h measures the level of exposure to value risk.

Total return of portfolio (Ri) takes both negative and positive values ranging from -8.528 and 13.33. 14 quarters out of 24 (58%) have positive portfolio return with the rest 10 (42%) having negative return. Risk free rate (Rf) fluctuated over the period under study between 0.0001 and 0.06122, excess portfolio return (Ri-Rf) takes both negative and positive values ranging from -8.54 and 13.29. Total market portfolio return (Rm) ranges between -0.17 and 0.26, excess market portfolio (Rm-Rf) return ranges between -0.29 and 0.23. 10 observations (42%) have positive excess portfolio return (Ri-Rf) as well as

excess market portfolio (Rm-Rf) while the rest 14 observations (58%) have negative positive excess portfolio return (Ri-Rf) as well as excess market portfolio (Rm-Rf).

SMB ranges between -4.67 and 3.97. From the research findings there are 16 out of 24 observations (67%) with negative SMB and 8 observations (33%) with positive SMB. HML ranges between -2.37 and 2.78. 6 observations out of 24 (25%) have positive HML while the rest 18 (75%) observations have negative HML.

4.3 Estimation Results

A linear model was used in estimating the effects of the three risk factors on excess portfolio returns. Estimation results are summarized in tables below.

Table 4.1 Regression Analysis Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.898[a]	.806	.797	2.59246
2	.906[b]	.822	.805	2.54503
3	.919[c]	.845	.822	2.43051

1. Predictors: (Constant), Rm-Rf

2. Predictors: (Constant), Rm-Rf, SMB

3. Predictors: (Constant), Rm-Rf, SMB, HML

Source: Research findings

R square is 0.845 meaning 84.50% of the variance in excess portfolio returns (dependent variable) is explained by changes in the three independent variables namely risk, size and value.

Table 4.2 Analysis of Variance

ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	614.703	1	614.703	91.462	.000[b]
	Residual	147.859	22	6.721		
	Total	762.562	23			
2	Regression	626.541	2	313.271	48.365	.000[c]
	Residual	136.021	21	6.477		
	Total	762.562	23			
3	Regression	644.415	3	214.805	36.362	.000[d]
	Residual	118.147	20	5.907		
	Total	762.562	23			

Dependent Variable: Ri-Rf

1. Predictors: (Constant), Rm-Rf

2. Predictors: (Constant), Rm-Rf, SMB

3. Predictors: (Constant), Rm-Rf, SMB, HML

Source: Research findings

P value is 0.000 which is significant. The slope of SMB is 0.318 indicating that for every unit increase in the size factor excess portfolio return increases by 0.318.

Table 4.3 Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.465	.530		2.765	.011
	Rm-Rf	37.570	3.928	.898	9.564	.000
2	(Constant)	1.754	.562		3.119	.005
	Rm-Rf	41.966	5.044	1.003	8.319	.000
	SMB	.398	.295	.163	1.352	.191
3	(Constant)	1.987	.553		3.590	.002
	Rm-Rf	42.453	4.826	1.015	8.798	.000
	SMB	.318	.285	.130	1.116	.278
	HML	.746	.429	.159	1.739	.097

a. Dependent Variable: Ri-Rf

Source: Research findings

α or the constant is 1.987, b as a measure of the exposure an asset has to market risk is 42.453, *s* measuring the level of exposure to size risk is 0.318 and *h* measuring the level of exposure to value risk is 0.746. The t statistic is 3.590 for the constant, 8.798 for b,

1.116 for s and 1.739 for h. Significance value is 0.002 for the constant, 0.000 for b, 0.278 for s and 0.097 for h.

4.4 Interpretation of Findings

From the research findings, it is observed that for CAPM beta takes both negative and positive values. Negative betas are for stocks that tend to go down when the market goes up and vice versa. This study shows that 28 stocks went down when the market went up while 31 stocks went up when the market went up. The remaining 2 stocks with zero betas did not change with market changes. These 2 stocks are Hutchings Biemer Ltd and Kenya Orchards which had been suspended from trading throughout the period under study. The two stock prices remained constant throughout the research period with Hutchings Biemer Ltd price standing at Kes 20.25 while Kenya Orchards price stood at Kes 3.00.

Stocks with beta scores below 1.0 are considered defensive or less sensitive to market fluctuations while those with beta scores above 1.0 are considered offensive or aggressive meaning they are more sensitive to market fluctuations. From the CAPM research findings, 17 stocks were less sensitive to market fluctuations while 42 stocks were more sensitive to market fluctuations and the remaining 2 stocks with zero betas were not sensitive to market fluctuations.

From the CAPM research findings, 41 stocks have positive excess return while the rest 20 stocks have negative excess returns. The excess returns known as alpha is a measure of performance for stock managers. Positive excess return is seen as over performance while negative excess returns as under performance. Therefore managers of 41 listed firms with

positive excess returns could be termed to have over performed as compared to those in the remaining 20 listed firms with negative excess returned being termed to have underperformed.

For this study the significance level was 95%. From the CAPM research findings, 4 stocks significance values are less than 0.05 meaning the difference between expected returns predicted by CAPM and actual returns is statistically significant. Significance values of the remaining 57 stocks are above 0.05 meaning that the difference between expected returns predicted by CAPM and actual returns is not statistically significant.

From the research findings on Fama-French Three Factor Model, total return of portfolio (Ri) takes both negative and positive values ranging from -8.528 and 13.33 over the 24 quarters studied. 14 quarters have positive portfolio returns with the rest 10 having negative return. Negative returns were due to capital loss captured by price reduction while positive returns were a reflection of increase in price as well as dividends. The risk free rate (Rf) fluctuated over the period under study between 0.0001 and 0.06122. It was lowest in December 2013 with a value of 0.0001.

From the research findings on Fama-French Three Factor Model, excess portfolio return (Ri-Rf) takes both negative and positive values ranging from -8.54 and 13.29. Negative values are a sign that the return on the total portfolio was less than the risk free rate with investors losing on the returns of riskless assets. This means that investors were not compensated for the additional risk and vice versa. Total market portfolio return (Rm) ranges between -0.17 and 0.26. Negative market return was due to poor performance of stock returns measured by NASI. Excess market portfolio (Rm-Rf) return ranges between

-0.29 and 0.23, negative return stipulates that the market performed poorly compared with the return on the riskless asset and vice versa.

From the research findings on Fama-French Three Factor Model, SMB ranges between -4.67 and 3.97. A positive SMB in a quarter indicates that small cap stocks (stocks classified as small in terms of market capitalization) outperformed large cap stocks in that month and vice versa. From the research findings there are 16 out of 24 observations (67%) with negative SMB and 8 observations (33%) with positive SMB. This means that big caps stocks outperformed small cap stocks. HML ranges between -2.37 and 2.78. 6 observations out of 24 (25%) have positive HML while the rest 18 (75%) observations have negative HML. A positive HML in a quarter indicates that value stocks outperformed growth stocks in that month while a negative HML in a given quarter indicates the growth stocks outperformed. Value stocks are those stocks with high book-market-equity ratio while growth stocks are those with low book-market-equity ratio.

From the research findings on Fama-French Three Factor Model, the intercept term is statistically significant as it has a significance value of 0.002 which is less than 0.05. SMB and HML are not statistically significant as their significance values of 0.278 and 0.097 respectively are greater than 0.05. Excess market portfolio is statistically significant with a significance value of 0.000 which is less than 0.05.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter gives a summary of the findings from chapter four, conclusion of the study and recommendations for further research. It draws conclusion on the applicability of CAPM and Fama-French three factor model on stocks listed in the NSE.

5.2 Summary

From the research findings, 46% (28) stocks listed in the NSE have negative betas hence negative relationship with market performance, 51% (31) listed stocks have positive beta hence positive relationship with market performance while the remaining 3% (2) have zero beta hence no relationship. 3% (2) stocks were the stocks suspended from trading during the period under study. 28% (17) stocks excluding 3% (2) stocks with zero betas have beta scores below 1.0 meaning they are more sensitive to market fluctuations; zero beta score means lack of sensitivity to market fluctuations while the remaining 69% (42) stocks with beta scores greater than 1.0 means more sensitivity to market fluctuations.

From the research findings, 67% (41) have positive excess return while the remaining 33% (20) have negative excess returns. Positive excess return is seen as over performance of fund managers while negative excess returns as under performance. 93% (57) stocks have significance values greater than 0.05 meaning that the difference between expected returns predicted by CAPM and actual returns is not statistically significant while the remaining 7% (4) have significance values less than 0.05 meaning the difference between expected returns predicted by CAPM and actual returns is statistically significant.

For the Fama-French Three Factor Model market risk factor, Rm-Rf, size risk factor (SMB) and BE/ME risk factor (HML) were used as the explanatory variables. Estimation results show that the Fama-French Three Factor Model has very limited potential to explain variations on the return of portfolios which are constructed by using stocks operating on NSE during the years from 1st January 2008 to 31st December 2013.

The empirical part of the study is based on quarterly excess return on each stock. Six portfolios were constructed in order to test the model. These portfolios are S/H (small caps stock and high BE/ME), S/M (small caps stock and medium BE/ME), S/L (small caps stock and low BE/ME), B/H (big caps stock and high BE/ME), B/M (big caps stock and medium BE/ME) and B/L (big caps stock and low BE/ME).

Statistical results show that big size portfolios overwhelm small size portfolios on realized excess returns. From the research findings there are 16 out of 24 observations (67%) have negative SMB while 8 observations (33%) have positive SMB. Moreover low book-to-market equity stocks outperformed high book-to-market equity stocks. 6 observations out of 24 (25%) have positive HML while the rest 18 (75%) observations have negative HML.

5.3 Conclusion

The research finding revealed the applicability of CAPM as a stock valuation model for the period under study. The difference between expected returns predicted by CAPM and actual returns were not statistically significant.

On the other hand, research findings revealed that the Fama-French Three Factor model has very limited potential to explain variations on the return of portfolios which are constructed by using stocks operating on NSE during the years from 1st January 2008 to 31st December 2013. There was a positive relation between average return and the size of the portfolios. In other words, big size portfolios outperformed small size portfolios. There was a negative relation between book-to-market equity and average return with low book-to-market equity stocks outperforming High book-to-market equity stocks.

5.4 Recommendation for Policy

From the findings of this study, CAPM is recommended as a valuation model in valuing stocks listed in the NSE. The difference between expected returns predicted by CAPM and actual returns were not statistically significant.

On the other hand, the findings recommend a search on the limited potential of Fama-French Three Factor Model as a valuation model for stocks listed in the NSE. In theory the Fama-French Three Factor Model is an improvement of CAPM and it is expected that its findings should explain the relationship between risk and return better than CAPM.

The study recommends a study on the Carhart four-factor model as an extension of the Fama-French Three Factor Model including a momentum factor. Momentum in stock is described as the tendency for the stock price to continue rising if it is going up and to continue declining if it is going down. According to Carhart (1997), the momentum factor can be computed by subtracting the equal weighted average of the highest performing firms from the equal weighted average of the lowest performing firms, lagged one month. A stock is showing momentum if its prior 12-month average of returns is positive.

5.5 Limitations of the Study

From the study, there were various research difficulties experienced. First, the study considered quantitative data only. It is clear that some qualitative factors affect stock returns either directly or indirectly. Behavioral finance argues that due to behavioral influences such as emotions, herd instincts and overreaction there is a discrepancy between market price and intrinsic value. Noise traders (not rational) actions lead to shifts in aggregate demand. Second, arbitrage operation by rational investors tends to be limited as there are risks associated with it. The first risk is fundamental. Buying 'undervalued' stocks tend to be risky because the market may fall further and inflict losses. The second risk is resale price risk and it arises mainly from the fact that arbitrageurs have finite horizons.

Three stocks which had been suspended from trading either during the entire period of study under this study were excluded from analysis. The stocks include Kenya Orchards Ltd, Hutchings Biemer Ltd and A. Baumann Company Ltd. During the period under suspension there were no stock returns as measured by changes in prices. Hutchings Biemer Ltd has been suspended for over ten years. Kenya Orchards maintained a steady price of Sh 3.00 during the entire period under study, A. Baumann Company Ltd Sh 11.10 and Hutchings Biemer Ltd.

The financial statements obtained for this study were not 100% accurate as some of them had material restatement of figures in subsequent periods.

5.6 Areas for Further Research

Similar studies should be carried out to cover firms not listed in the NSE. A comparison of CAPM and Fama-French Three Factor Model applicability on stocks not listed in the NSE versus the listed stocks should be done.

This study should be replicated in other countries. Studies to be conducted in both developed and developing countries and findings analyzed for statistical differences.

Other factors affecting stock returns other than risk to be considered. These factors include interest rates and inflation among others.

Studies should be carried out on behavioral finance influence on stock returns. Behavioral finance could be one of the factors influencing investors' decision making in investing in the NSE. Behavioral finance argues that due to behavioral influences such as emotions, herd instincts and overreaction there is a discrepancy between market price and intrinsic value. Behaviorists' argument rests on two assumptions. First, some investors known as noise traders are not rational as their demand for risky assets is influenced by beliefs or sentiments that are not fully supported by fundamentals. Noise traders' actions lead to shifts in aggregate demand. Second, arbitrage operation by rational investors tends to be limited as there are risks associated with it. The first risk is fundamental. Buying 'undervalued' stocks tend to be risky because the market may fall further and inflict losses. The second risk is resale price risk and it arises mainly from the fact that arbitrageurs have finite horizons.

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APPENDIX I: LISTED COMPANIES AT NSE AS AT 31ST DECEMBER 2013

AGRICULTURAL

1 Eaagads Ltd

2 Kapchorua Tea Co. Ltd

3 Kakuzi

4 Limuru Tea Co. Ltd

5 Rea Vipingo Plantations Ltd

6 Sasini Ltd

7 Williamson Tea Kenya Ltd

COMMERCIAL AND SERVICES

8 Express Ltd

9 Kenya Airways Ltd

10 Nation Media Group

11 Standard Group Ltd

12 TPS Eastern Africa (Serena) Ltd

13 Scangroup Ltd

14 Uchumi Supermarket Ltd

15 Hutchings Biemer Ltd

16 Longhorn Kenya Ltd

TELECOMMUNICATION AND TECHNOLOGY

17 Safaricom Ltd

AUTOMOBILES AND ACCESSORIES

18 Car and General (K) Ltd

19 CMC Holdings Ltd

20 Sameer Africa Ltd

21 Marshalls (E.A.) Ltd

BANKING

22 Barclays Bank Ltd

23 CFC Stanbic Holdings Ltd

24 I&M Holdings Ltd

25 Diamond Trust Bank Kenya Ltd

26 Housing Finance Co Ltd

27 Kenya Commercial Bank Ltd

28 National Bank of Kenya Ltd

29 NIC Bank Ltd

30 Standard Chartered Bank Ltd

31 Equity Bank Ltd

32 The Co-operative Bank of Kenya Ltd

INSURANCE

33 Jubilee Holdings Ltd

34 Pan Africa Insurance Holdings Ltd

35 Kenya Re-Insurance Corporation Ltd

36 Liberty Kenya Holdings Ltd

37 British-American Investments Company (Kenya) Ltd

38 CIC Insurance Group Ltd

INVESTMENT

39 Olympia Capital Holdings ltd

40 Centum Investment Co Ltd

41 Trans-Century Ltd

MANUFACTURING AND ALLIED

42 B.O.C Kenya Ltd

43 British American Tobacco Kenya Ltd

44 Carbacid Investments Ltd

45 East African Breweries Ltd

46 Mumias Sugar Co. Ltd

47 Unga Group Ltd

48 Eveready East Africa Ltd

49 Kenya Orchards Ltd

50 A.Baumann CO Ltd

CONSTRUCTION AND ALLIED

51 Athi River Mining

52 Bamburi Cement Ltd

53 Crown Berger Ltd

54 E.A.Cables Ltd

55 E.A.Portland Cement Ltd

ENERGY AND PETROLEUM

56 KenolKobil Ltd

57 Total Kenya Ltd

58 KenGen Ltd

59 Kenya Power & Lighting Co Ltd

60 Umeme Ltd

GROWTH ENTERPRISE MARKET SEGMENT

61 Home Afrika Ltd

Source: NSE website (www.nse.co.ke)

APPENDIX II: A LIST OF FIRMS BETAS, EXCESS RETURNS AND SIGNIFICANCE VALUES

	Stocks	Beta	Excess Average Return	Significance Value
1	Eaagads Ltd	-0.30	-0.13	0.756
2	Kapchorua Tea Co. Ltd	0.07	0.47	0.115
3	Kakuzi	-5.69	1.69	0.355
4	Limuru Tea Co. Ltd	-1.36	0.55	0.292
5	Rea Vipingo Plantations Ltd	-3.52	1.17	0.315
6	Sasini Ltd	-5.29	1.78	0.375
7	Williamson Tea Kenya Ltd	-7.10	2.72	0.217
8	Express Ltd	-4.26	0.78	0.356
9	Kenya Airways Ltd	-1.45	0.17	0.853
10	Nation Media Group	-1.31	0.85	0.166
11	Standard Group Ltd	-0.71	-0.39	0.210
12	TPS Eastern Africa (Serena) Ltd	-1.60	1.07	0.101
13	Scangroup Ltd	2.04	0.28	0.054
14	Uchumi Supermarket Ltd	-0.20	0.55	0.185
15	Hutchings Biemer Ltd	0.00	0.03	0.000
16	Longhorn Kenya Ltd	-8.18	0.40	0.278
17	Safaricom Ltd	4.72	0.53	0.376

18	Car and General (K) Ltd	-1.92	0.54	0.355
19	CMC Holdings Ltd	2.28	-0.13	0.795
20	Sameer Africa Ltd	-1.82	1.65	0.166
21	Marshalls (E.A.) Ltd	0.01	-0.39	0.054
22	Barclays Bank Ltd	2.31	-0.19	0.652
23	CFC Stanbic Holdings Ltd	3.65	-0.08	0.943
24	I&M Holdings Ltd	5.50	-0.08	0.435
25	Diamond Trust Bank Kenya Ltd	0.22	0.86	0.056
26	Housing Finance Co Ltd	5.18	-0.77	0.428
27	Kenya Commercial Bank Ltd	0.25	0.30	0.193
28	National Bank of Kenya Ltd	-4.94	2.02	0.276
29	NIC Bank Ltd	5.22	-0.40	0.638
30	Standard Chartered Bank Ltd	-2.28	0.32	0.232
31	Equity Bank Ltd	4.44	-0.20	0.763
32	The Co-operative Bank of Kenya Ltd	6.53	-0.62	0.355
33	Jubilee Holdings Ltd	1.71	0.73	0.200
34	Pan Africa Insurance Holdings Ltd	0.56	0.64	0.223
35	Kenya Re-Insurance Corporation Ltd	2.16	0.13	0.669
36	Liberty Kenya Holdings Ltd	2.86	-0.08	0.163
37	British-American Investments Company	4.02	-0.22	0.463
38	CIC Insurance Group Ltd	2.23	-0.15	0.233
39	Olympia Capital Holdings ltd	1.39	0.47	0.086
40	Centum Investment Co Ltd	1.43	-0.76	0.044

41	Trans-Century Ltd	-1.44	0.23	0.376
42	B.O.C Kenya Ltd	0.20	-0.06	0.672
43	British American Tobacco Kenya Ltd	-0.13	0.21	0.314
44	Carbacid Investments Ltd	-4.22	0.40	0.361
45	East African Breweries Ltd	1.51	0.28	0.422
46	Mumias Sugar Co. Ltd	1.12	-0.31	0.375
47	Unga Group Ltd	-1.11	0.49	0.246
48	Eveready East Africa Ltd	1.72	0.02	0.962
49	Kenya Orchards Ltd	0.00	0.03	0.000
50	A.Baumann CO Ltd	-0.05	-0.11	0.033
51	Athi River Mining	0.59	0.19	0.166
52	Bamburi Cement Ltd	0.07	0.11	0.664
53	Crown Berger Ltd	-2.41	0.39	0.245
54	E.A.Cables Ltd	2.73	0.24	0.583
55	E.A.Portland Cement Ltd	0.28	-0.18	0.576
56	KenolKobil Ltd	-1.19	0.31	0.206
57	Total Kenya Ltd	-0.14	0.56	0.288
58	KenGen Ltd	-0.12	0.42	0.388
59	Kenya Power & Lighting Co Ltd	0.45	-0.07	0.797
60	Umeme Ltd	-2.50	0.06	0.091
61	Home Afrika Ltd	-2.04	0.21	0.485

Source: Research findings.

APPENDIX III: FAMA-FRENCH THREE FACTOR MODEL VARIABLES

Quarter	Ri	Rf	Ri-Rf	Rm	Rm-Rf	SMB	HML
March 2008	-0.28	0.03673	-0.32	-0.05	-0.09	-1.60	-0.44
June 2008	3.91	0.03673	3.87	0.18	0.14	-3.62	-0.98
Sep 2008	-8.12	0.05699	-8.17	-0.23	-0.29	2.53	1.01
Dec 2008	-4.59	0.06122	-4.65	-0.15	-0.21	-0.53	-0.17
March 2009	-8.01	0.04528	-8.06	-0.17	-0.22	1.81	-1.04
June 2009	9.09	0.04332	9.05	0.19	0.15	-4.67	0.01
Sep 2009	-3.17	0.04107	-3.21	-0.06	-0.10	1.29	-0.11
Dec 2009	3.40	0.03850	3.36	0.07	0.03	-0.94	1.39
March 2010	13.33	0.03905	13.29	0.17	0.13	2.91	-0.43
June 2010	4.82	0.03871	4.78	0.12	0.08	-3.24	-0.35
Sep 2010	4.24	0.03963	4.20	0.04	0.00	-3.02	-1.07
Dec 2010	-2.84	0.02626	-2.87	-0.01	-0.04	-1.52	-1.69
March 2011	-2.79	0.01167	-2.80	-0.09	-0.10	-0.33	-1.95
June 2011	-0.97	0.01455	-0.99	0.02	0.01	-1.45	-0.41
Sep 2011	-8.53	0.01485	-8.54	-0.26	-0.28	3.97	1.40
Dec 2011	-1.34	0.01148	-1.36	-0.01	-0.03	0.74	-0.04
March 2012	3.28	0.02822	3.25	0.08	0.05	0.54	-2.37
June 2012	6.80	0.02334	6.77	0.10	0.07	-0.38	-0.66

Sep 2012	0.09	0.01458	0.07	0.08	0.07	-2.57	-1.50
Dec 2012	0.84	0.00345	0.84	0.08	0.08	-1.56	-0.97
March 2013	10.80	0.00059	10.80	0.23	0.23	-4.50	-0.45
June 2013	1.62	0.00386	1.62	-0.01	-0.01	2.62	1.03
Sep 2013	1.80	0.00668	1.80	0.09	0.09	-0.68	-2.03
Dec 2013	6.05	0.00001	6.05	0.07	0.07	-1.33	2.78

Source: Research findings