

The relationship between unsystematic risk and returns at the Nairobi Securities Exchange

Daniel Nyangwono Omeri

Reg. No. 113443

**A research thesis submitted in partial fulfillment of the requirements for the degree of
Master of Commerce at Strathmore University.**

Strathmore University Business School

Strathmore University

Nairobi, Kenya

September, 2021

**This thesis is available for Library use on the understanding that it is copyright material and that
no quotation from the thesis may be published without proper acknowledgement.**

DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

© No part of this thesis may be reproduced without the permission of the author and Strathmore University

Daniel Nyangwono Omeri



27th July 2021

Approval

This research thesis of Daniel N. Omeri was reviewed and approved by the following:

Dr. Freshia Mugo Waweru

Senior Lecturer, Strathmore University Business School

Dr. George Njenga

Executive Dean, Strathmore University Business School

Director, Office of Graduate Studies

ABSTRACT

This study sought to assess the relationship between unsystematic risk and returns in the Kenyan stock market by looking at firms that are listed at the Nairobi Securities exchange. Unsystematic risk is a factor that investors consider when making investment choices. Whereas institutional investors diversify to minimize this risk, retail investors are exposed to unsystematic risk since they hold single stocks. This formed the basis of this study as it sought further to explain the role that unsystematic risk plays in the determination of stock returns at the Nairobi Securities Exchange. The period of study was between 2010 and 2019 with the objectives of examining the trend of unsystematic risk, investigating the forecasting ability of unsystematic risk on stock returns, and determine the optimum portfolio for an investor at the Nairobi Securities exchange. Portfolios were formed using a purposive sampling method as securities were organized in ascending order of their unsystematic risk values and portfolios selected in the increasing order of the unsystematic risk values. To calculate unsystematic risk, CAPM was used to control for firm-specific risk, which was determined as the standard deviation of the residuals from regressing excess returns. This study adopted a positivism research philosophy and a quantitative research design. Secondary data was used in the study and was collected using a data capture sheet. The study used trend analysis, regression analysis, and a mean-variance model to analyze data. Three diagnostic tests, tests for normality, stationarity, and autocorrelation were conducted to ensure that the findings don't lead to a spurious regression. From the result of the trend analysis, value-weighted unsystematic risk showed an insignificant trend for the period of study. The study revealed that unsystematic risk is negatively related to the stock market returns and cannot forecast stock market returns at NSE. Furthermore, an investor needed a portfolio of between 17 to 22 securities to achieve an optimum portfolio at Nairobi Securities Exchange. This study contributes to the existing knowledge of the relationship between unsystematic risk and stock market returns in developing and emerging capital markets.

Keywords: Idiosyncratic volatility, Nairobi Securities Exchange, Stock market returns, Optimum portfolio

TABLE OF CONTENTS

DECLARATION	ii
ABSTRACT.....	iii
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF ABBREVIATIONS AND ACRONYMS	ix
DEFINITION OF TERMS	x
ACKNOWLEDGEMENT	xi
CHAPTER ONE - INTRODUCTION TO THE STUDY	1
1.1 Background of the Study.....	1
1.2 PROBLEM DEFINITION	5
1.4 RESEARCH OBJECTIVES	7
1.4.1 Specific Objectives	7
1.5 RESEARCH QUESTIONS.....	7
1.6 SCOPE OF THE STUDY	7
1.7 JUSTIFICATION OF THE STUDY.....	8
1.7.1 Investors.....	8
1.7.2 Researchers	8
1.7.3 Practitioners	9
1.7.4 Policy Makers	9
CHAPTER TWO - LITERATURE REVIEW.....	10
2.1 Introduction	10
2.2 Theoretical Framework	10
2.2.1 Capital Asset Pricing Model (CAPM).....	10
2.3 Empirical Review	15
2.3.1 Relationship between the trend of unsystematic risk and stock returns	16
2.3.2 Forecasting Ability of Unsystematic Risk on stock returns	17
2.3.3 Relationship between unsystematic risk and returns in forming an optimum portfolio	19
2.4 Gaps in Research.....	20
2.5 Conceptual Framework of unsystematic risk and stock returns.....	24
2.6. Operationalization of variables	25

CHAPTER 3 -- RESEARCH METHODOLOGY	26
3.1 Introduction	26
3.2 Research Philosophy	26
3.3 Research Design.....	26
3.4 Population and Sampling	27
3.5 Data Collection methods	27
3.6 Data Analysis	28
3.6.1 Trend Analysis for Unsystematic risk	28
3.6.2 Investigating forecasting ability of unsystematic risk	28
3.6.3 Determining optimum portfolio size using Mean-Variance Model	29
3.7 Research Quality	30
3.8 Ethical considerations	30
CHAPTER FOUR - PRESENTATION OF RESEARCH FINDINGS AND ANALYSIS	32
4.1. Introduction	32
4.2. General Information	32
4.3 Descriptive statistics.....	32
4.3.1 Univariate Statistics.....	32
4.3.2 Test for unit root.....	33
4.3.3Test for Normality	34
4.4 Trend of Unsystematic Risk for the period of 2010 to 2019 in the NSE.....	34
4.5 Forecasting ability of unsystematic risk.....	35
4.6 Determining the optimum portfolio size for an investor at NSE	37
4.6.1 Empirical model in determining the optimum portfolio size	42
4.7 Chapter Summary.....	43
CHAPTER 5 - DISCUSSIONS, CONCLUSIONS, AND RECOMMENDATIONS	45
5.1 Introduction	45
5.2 Discussion of findings.....	45
5.2.1 Trend of unsystematic risk for the period between 2010 to 2019 at NSE.....	45
5.2.2 Forecasting ability of Unsystematic risk on returns at NSE.....	46
5.2.3 The relationship between unsystematic risk and stock returns in determining the optimum portfolio.....	47

5.3 Conclusions	48
5.4. Recommendations per objective to beneficiaries identified in chapter 1.....	48
5.4.1 To determine the trend of unsystematic risk at NSE.....	48
5.4.2 Forecasting ability of unsystematic risk on stock market returns	49
5.4.3 Determining the optimal portfolio size at NSE	49
5.5. Areas of Further Research.....	49
5.6 Limitations of the study.....	49
REFERENCES	50
APPENDICES	55
Appendix I: Listed Companies at Nairobi Securities Exchange.....	55
Appendix II: List of Companies included in the sample.....	57
Appendix III: List of Companies not included in the study.....	59
Appendix IV: Letter of Introduction.....	60
Appendix V: Ethical Approval Letter	61
Appendix VI: Research Permit License.....	62
Appendix VII: List of portfolios and their security component.....	63

LIST OF TABLES

Table 2.1: Research Gaps Matrix	21
Table 2.2: Operationalization of Variables	25
Table 4.1: Univariate statistics.....	33
Table 4.2: ADF and Philips Perron Unit root tests.....	33
Table 4.3: Result of Skewness and Kurtosis Tests.....	34
Table 4.4: Time sequence stationary test	34
Table 4.5: Forecasting stock returns using Value Weighted unsystematic risk.....	36
Table 4.6: Securities Unsystematic risk, Average returns, and variance	37
Table 4.7: Portfolio Size, Variance and standard deviation	39
Table 4.8: Regression model goodness of fit statistics	42
Table 4.9: Analysis of Variance (ANOVA)	42
Table 4.10: Regression Model coefficients	43

LIST OF FIGURES

Figure 1.1: NSE Stock Market Returns (NASI) for the period between 2010 and 2019	5
Figure 2.1: Conceptual framework of unsystematic risk and stock returns	25
Figure 4.1. The annualized trend of unsystematic risk	35
Figure 4.2. Portfolio risk diversification at the Nairobi Securities Exchange	41

LIST OF ABBREVIATIONS AND ACRONYMS

CMA – Capital Markets Authority

NSE – Nairobi Securities Exchange

US – United States

UK- United Kingdom

CAPM – Capital Asset Pricing Model

MPT – Modern Portfolio Theory

VWIV -Value Weighted Idiosyncratic Volatility

CFI – Corporate Finance Institute

IV – Idiosyncratic Volatility / Unsystematic risk

DEFINITION OF TERMS

Unsystematic risk	It is part of the total risk of the returns of an asset that cannot be explained by market returns and can be diversified away in a large portfolio (Sharpe, 1964; Lintner, 1965). Also referred to as, idiosyncratic volatility, diversifiable risk
Optimum Portfolio	A portfolio that will give an investor the maximum expected return with minimum variance (Markowitz, 1952).
Stock	Single unit of ownership that is traded at a securities exchange. Also known as a share or equity (CFI).
Stock Market	Exchange where individuals can buy and sell individual shares of a company (CFI).
Forecasting	Process of estimating or predicting future performance (CFI).

ACKNOWLEDGEMENT

I thank our God Almighty for the gift of life, good health, and peace of mind while undertaking this thesis. I want to thank Strathmore University Business School for giving me this great opportunity to undertake this study. I also owe a lot of gratitude to my able supervisor Dr. Freshia Waweru for her valuable guidance, without which this work would not have been accomplished. I also thank my classmates, Mr. Chakaya Muhwa and Ms. Hope Robert, and my friends for their contribution to knowledge and exchange of ideas. I thank my father Mr. Abel Oino and Mrs. Ruth Omeri for the tremendous support and encouragement while undertaking this study and finally my siblings, Donald, Nancy, Nathan, and Javan for providing a conducive environment to undertake this study. All your effort is so much appreciated.

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Background of the Study

Risk is an important factor that an investor considers when deciding on investments. The risk of assets is comprised of unsystematic and systematic risk. Investors form portfolio securities to reduce unsystematic risk whereas systematic risk will remain attached to individual securities (Asri, Ali, Habbe, & Rura, 2017). The role of unsystematic risk in explaining varying returns on stocks is a key pillar of modern financial theories. Alternative theories of behavioral finance show a positive relationship between firm-specific risk and excess stock returns, whereas classical financial theories suggest that unsystematic risk doesn't play a key role in explaining why some securities have a higher return than others (Luvisotti, 2013). A study by Mehra, Wahal & Xie, (2021) on the conditional pricing of unsystematic risk reveals that average unsystematic risk is economically meaningful and readily identifiable, further suggesting that the premium of bearing unsystematic risk should vary with average unsystematic risk.

Unsystematic risk is also defined as diversifiable risk, idiosyncratic risk, or firm-specific risk. Diversification and sharing of risk are fundamental principles of modern finance since investors tend to diversify by holding a portfolio of securities to reduce diversifiable risk. However, empirical evidence shows that household portfolios are not effectively diversified with many people holding substantial single stocks (Heaton & Lucas, 2000). Investors bear substantial un-diversifiable risk yet from a portfolio theory standpoint they don't seem to be effectively compensated. This implies that many investors may be willing to take risks that are poorly rewarded despite the availability of better investment opportunities, (Vissing-Jorgensen, 2002; Hall & Woodward, 2007). A study by Nikolai, (2010) on the behavior of investors in regards to social classes attitude towards diversification reveals that with increasing individual wealth relative to average wealth level, richer households invest in individual-specific unsystematic assets exposing the investor to unsystematic risk.

Unsystematic risk is therefore an important component of individual stock returns since many investors hold individual stocks largely and may not be able to diversify according to financial theory recommendations or because of restrictions brought about by corporate compensation

policies. This would result in exposure to unsystematic risk and may thus be affected by it just as they are affected by market risk. Unsystematic risk is also important in the sense that investors diversify their portfolios by holding an approximate well-diversified portfolio that comprises between 20 to 30 securities. However, the accuracy of this approximation will be dependent on the individual securities that make up the portfolio. Unsystematic risk is also important to arbitragers since they trade with the target of exploitation of mispricing of individual securities thus exposing them to risk associated with those individual securities rather than systematic risk. When the unsystematic risk is high, it can also result in larger pricing errors. (Schwartz & Ingersoll, 1988). Unsystematic risk is important in event studies as the events affect individual stocks and the statistical significance of abnormal event-related returns is determined by the volatility of individual stock returns relative to the market (Campbell et al., 1997). Unsystematic risk is also important in the pricing of options since the prices of options on single stocks are dependent on total market risk which includes firm-level, industry level, and market risk.

Since the proposition of the 1960s CAPM and later the Fama & French factor model (1996), the debate has resulted in studying the relevance of unsystematic risk in regards to stock returns. CAPM argues that unsystematic risk should not be priced whereas Merton (1987) suggests that it should be rewarded with higher expected returns in a case where investors are not able to diversify properly. According to Mehra et al., (2021) high average unsystematic risk results in the high marginal benefit of diversification, thus implying a lower risk premium. A study by Marsh & Merton, (1986) on markets with imperfect information shows the presence of a positive relationship between unsystematic risk and stock returns. A study by Malkiel & Xu, (2006) reveals that unsystematic risk is related positively to stock returns in the case where investors do not hold a market portfolio. Across the world, stocks with recent past lower unsystematic risk have shown to have much higher returns than stocks with recent past higher unsystematic risk. This relationship appears in different world regions and a study by Ang, Hodrick, Xing, & Zhang, (2009) suggests that this is a worldwide observable relationship rather than just a selected or country-specified effect. This study conducted in the US market revealed a difference of above 1% in average returns between stocks having low and high unsystematic risk is large per month. These studies suggest that unsystematic risk is a critical component of stock returns in developed markets. A study by Goyal & Santa Clara, (2003) suggests that unsystematic risk matters by demonstrating that total risk is related to market returns.

However, Blockman, Shutte & Yu, (2009) in examining whether the unsystematic risk is related to returns of securities in 44 international markets and shows a negative relationship in the Australian market. Masry & Menshawy, (2017) conducted a study in the Egyptian Securities Exchange and revealed that unsystematic risk is insignificant in predicting future returns. The study also concluded that in emerging capital markets, big size securities have a lower firm-specific risk as compared to small size securities but their firm-specific risk behavior tends to be similar. While unsystematic risk does not have a specified factor model that can be used to price it, it can be linked to the expected returns of stock in an environment where there are incomplete information and frictions.

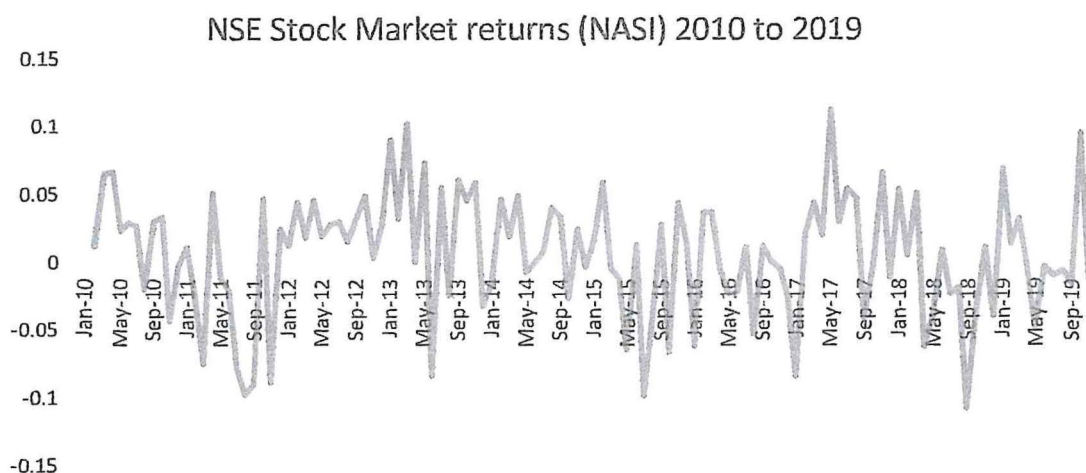
The trend of unsystematic risk has also become an important subject of investigation. A study by Campbell, Lettau, Malkiel & Xu, (2001) in the US market for the period between 1962 and 1997 exhibits a significant upward trend of unsystematic risk while industry and market risk do not portray any significant trend. These studies rekindled interest in this field leading to research to examine this relationship. Brandt, Brav, Graham & Kumar (2008) extended the period of study of Campbell, Lettau, Malkiel & Xu, (2001) by an additional ten years and the results of the study revealed that the coefficient of the trend was lower and not statistically significant. Bakaert, Hodrick & Zhang, (2008) used company-specific data to study a total of 23 developed markets for the period between 1980 and 2005 and revealed that unsystematic risk did not have a significant trend demonstrating a structural breakdown for the period between 1997 and 2000. Investors are exposed to risk hence investment decisions highly depend on the amount of information available that can inform the investor. Unsystematic risk can be overlooked in decision-making if available knowledge from research concludes that it is insignificant in decision-making. Inconclusive evidence can be conflicting with the investor.

Unsystematic risk also affects portfolio management decisions since an increase in unsystematic risk lowers correlations in stock returns thus understanding the portfolio properties of unsystematic risk is quite helpful for fund managers. A study by Huni & Sibindi, (2020) on the feasibility of constructing optimal portfolios using securities at the Johannesburg Securities Exchange using the Mean-Variance framework confirmed the feasibility of the model and revealed that mean-variance efficient portfolios yield diversification benefits despite their positive correlation with one another. Markowitz (1952) suggests a portfolio that will give the

investor maximum expected return and minimum variance referred to as an optimum portfolio. An optimal portfolio is an efficient portfolio that is often preferred by an investor since it gives the investor maximum expected returns with minimum variance. According to Evans & Archer (1968), increased the number of securities in a portfolio beyond the optimal size depends on marginal benefits of risk reduction from diversification against the marginal cost of maintaining the portfolio in terms of operating costs hence risk reduction benefits may become insignificant. The Portfolio return is very important to all investors since diversification reduces unsystematic risk without compromising on expected returns (Reilley & Brown 2012). A study by Campbell, et al.(2001) reveals that an investor needed 20 stocks to reduce risk by 10% before 1985 and 50 stocks to achieve a similar risk reduction in the 1990s. Kearny & Poti, (2008) reveal that a portfolio of 35 stocks was needed to reduce unsystematic risk in 1974 whereas, in the year 2003, a portfolio of 166 stocks was needed in the European Stock market to reach the same result. A study by Xu (2003) examining diversification benefits in China reveals that more securities would be needed to achieve a given amount of risk. A study conducted in the Kenyan stock market by Nyarigi, (2001) on the risk-return importance of portfolio diversification at NSE shows that risk-minimizing portfolios were 13 securities. Another research done by Kisaka et al., (2015) revealed that the optimal portfolio size of stocks at NSE lies between 18 to 22 stocks. This study covered the period between 2009 and 2013. These show that there is no consensus on the optimal portfolio size.

Emerging capital markets such as Nairobi Securities Exchange attract operational inefficiencies due to the institutional environment in which they operate. A study by Masry (2016) suggests that securities prices are more predictable in developing markets since these markets lack extensive and appropriate institutional setups. While considerable research has been done, there is limited empirical evidence on the relationship between unsystematic risk and stock returns. Nairobi Securities Exchange attracts a relatively high number of investors with the same characteristics as discussed and the research aims at providing evidence on how unsystematic volatility is related to stock returns for companies listed at Nairobi Securities Exchange. The figure below presents the graph on the average stock market returns (Nairobi All Shares Index) for companies listed at the Nairobi securities exchange for the period between 2010 and 2019.

Figure 1. NSE average Stock Market Returns (NASI) for the period between 2010 and 2019



The returns vary between -0.1 and slightly above 0.1.

1.2 PROBLEM DEFINITION

The dilemma on the relevance of unsystematic risk rekindled interest with conflicting findings in various studies. This study looks at the key studies that convey this puzzle. A study by Marsh & Merton, (1986) in markets with imperfect information reveals that unsystematic risk and stock returns are positively related. These findings rekindled interest in the study of unsystematic risk with Tinic & West,(1986) and Lehmann, (1990) reaffirming the importance of unsystematic risk whereas recent evidence casts doubt on these findings with a study by Guo & Savickas, (2008) providing proof of an increase in value-weighted unsystematic risk in the 1990s and reduction afterward. Campbell et al, (2001) demonstrated that only unsystematic risk shows an increasing trend that was significant for the period between 1962 to 1997. Brandt et al, (2008) extended the sample of Campbell et al, (2001) by an extra ten years and demonstrated a lower and insignificant coefficient of the trend which was attributed to periodic events in the 1990s which were related to speculative investing. Whereas they argue that unsystematic risk is an important component of stock returns, Masry and Menshawy, (2018) studying the Egyptian Securities Exchange reveal that unsystematic risk showed no trend between the period of 2006 to 2015. The evidence of these studies is inconclusive and may not be applicable in the Kenyan Stock Market.

A study by Malkiel & Xu, (2006) reveals a positive relationship between unsystematic risk and return of securities in a case where an investor doesn't hold a market portfolio. A study by Goyal

& Santa-Clara, (2003) demonstrates the evidence of a relationship between total risk and monthly returns. However, Wei & Zhang, (2005) reveal that the relationship between unsystematic risk and return of securities is representative as Guo & Savickas, (2006) suggest the predictability of value-weighted unsystematic risk on excess quarterly stock market returns. Bozhkov, Lee, Sivarajah, Despoudi & Nandy (2020) using the mean-reverting volatility model, examined whether the unsystematic risk is priced by the stock markets and the probable of mixed evidence in the US markets and revealed that one-period volatility forecasts are not significantly related to with stock market returns whereas a stronger correlation between unsystematic risk and stock returns during recessions suggest interaction of risk premium with decreased risk tolerance or other considerations in investments. Unpublished research by Gitari (1990) sought to establish whether unsystematic risk and stock returns are related at NSE and revealed a statistically insignificant relationship between unsystematic return and return of securities for the then-listed companies.

Investors decide to invest with the expectation of a return for a given amount of risk by holding an optimal portfolio. Studies conducted by Markowitz, (1952); Newbould & Poon, (1993); Statman, (1987); Campbell, Lettau, Malkiel & Xu, (2001); Kearny & Poti, (2008) reveal that portfolio variance decreases as the number of securities in the portfolio increases and an investor enjoys benefits of reduced risk by holding many assets in a portfolio. These studies also suggest a growing number of assets that make an optimum portfolio in the future period hence suggest an adjustment. A study conducted in the Kenyan stock market by Nyarigi, (2001) on risk-return merits of portfolio diversification at NSE revealed that risk-minimizing portfolios were 13 securities. Another study done by Kisaka et al., (2015) revealed that the optimal portfolio size of stocks at NSE lies between 18 to 22 stocks.

The Nairobi Securities Exchange has continued to develop evidenced by automated trading and listing of new firms increasing the number of investors in the stock market. However, most investors want to maximize profits without risk consideration as attributed to the herd mentality. The dilemma is on whether the unsystematic risk is relevant in decision making to these investors who are not able to effectively diversify their portfolio, whether to consider unsystematic risk in stock valuation or not and also on the optimal portfolio size for investors at NSE. This study aimed at filling this gap in asset pricing literature by identifying whether the

unsystematic risk has a significant trend, the optimal portfolio size for an investor at NSE, and if the unsystematic risk can be used by investors to predict future returns of stocks. The presence or absence of a trend is critical to decision making since investors anticipate for predictable volatility to make a better decision. The ability to forecast returns will also be of great benefit to investors as well as an optimum portfolio will guide institutional investors in the selection of favorable investments in stocks. The absence of this information will increase the uncertainty for an investor and make it a trial and error objective that could spell doom. This is a gap that this study sought to contribute to and provide more information that would increase the certainty of investment. The study focused on the research question; what is the relationship between unsystematic risk and stock returns for companies listed at NSE?

1.4 RESEARCH OBJECTIVES

The general objective of this study was to assess the relationship between unsystematic risk and stock returns for firms listed at Nairobi Securities exchange. To achieve this objective, specific objectives were tackled. They include;

1.4.1 Specific Objectives

- a) To examine whether unsystematic risk exhibits a significant trend at NSE.
- b) To investigate whether unsystematic risk predicts future stock market returns at NSE.
- c) To determine the optimal portfolio size for an investor at NSE.

1.5 RESEARCH QUESTIONS

- a) Does average unsystematic risk increase or decrease over time?
- b) What is the intertemporal relationship between unsystematic risk and stock returns?
- c) What is the optimal portfolio size for an investor at NSE?

1.6 SCOPE OF THE STUDY

The study was based on the Nairobi Securities Exchange. The specific population of the study was companies listed in the equity market. The study used historical data for a period of 10 years between 2010 and 2019 to capture extensively various events that are related to the variables in the study. . Secondly, previous studies (Masry & Menshawy, 2017; Leite, Pinto & Klotzle, 2016; Heaton & Lucas, 2000) used a period of ten to eleven years to evaluate these strategies and thus provided a good basis to select the period of study. The study focused on companies that have

not been delisted or suspended and also those listed with complete data for the period of study. The data was obtained from the Nairobi Securities Exchange, Central Bank of Kenya, and Capital Markets Authority.

1.7 JUSTIFICATION OF THE STUDY

This study focused on studying any significant differences in unsystematic risk patterns in stock returns by examining the small and large organizations and whether the observable patterns could be explained by common risk factors. An empirical finding provided insights about market efficiency, asset pricing, and designing investment strategies. The main importance of this study was to establish unsystematic risk's importance and necessity in considering it in stock valuation in NSE and to fill the gap in asset pricing literature.

The benefactors of this information are:

1.7.1 Investors

This study is relevant because of the different characteristics in assessing risk in CAPM and FF Model that is not under the Kenyan capital market. Changes in specific information that often occur affect a particular company or firm form the main basis of risk assessment by investors. This consideration was factored in by the unsystematic risk model. The findings of the research are helpful to the investors and researchers determine whether the Kenyan Capital market is part of markets with imperfect information which forms a critical element of investors' decision making. The research targeted at enabling investors in the Kenyan stock market to understand the role of unsystematic risk in stock price movements to assess their expected returns in their bid to maximize profits and minimize losses.

1.7.2 Researchers

This information is critical to future researchers and academicians. It contributes to the body of knowledge that has been researched to establish the relevance of risk to stock returns at NSE by revealing critical dynamics of unsystematic risk. The study offers a basis for further improvement of the various theories advanced to explain the relationship between unsystematic risk and stock returns. The study motivates the significance of the application of MPT and CAPM in studying asset pricing and provides proof of the application of the mean-variance

model in constructing portfolios. These theories and methodologies can be applied by researchers.

1.7.3 Practitioners

Practitioners such as portfolio managers have a mandate to maximize the wealth of the investor by optimizing portfolio returns. An understanding of this relationship between unsystematic risk and stock returns is important for portfolio managers in decision making on the choice of the portfolio since the whole essence of their scope is to minimize unsystematic risk and maximize returns.

1.7.4 Policy Makers

This study is informative to the future review of guidelines and policies for regulators and regulated institutions. Policy makers such as the capital markets authority (CMA) depend on the information on the overview of the performance of the market to make decisions based on the favorable guidelines that can help in stimulating growth and promote local investment. The study on unsystematic risk presents details on the risk exposure to retail investors whereas it provides evidence on the benefits of diversification which may largely be of help in understanding the investment environment.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter represents unsystematic risk literature on stock returns as related to this study. It gives a summary of previous studies done by different researchers in this field by summarizing the theoretical literature review on both unsystematic risk and stock returns and provides an empirical review on studies previously done. The chapter also includes the overview and gaps in the literature and conceptual framework. This chapter is organized in the following sections: 2.2: Theoretical Framework; 2.3: Empirical Framework 2.4: Gaps in Research, 2.5: Conceptual Framework; 2.6: Operationalization of variables.

2.2 Theoretical Framework

This section reviews the various theories that have been advanced on the diversifiable risk that informs this study. These theories anchored this research due to their predominance in studies related to risk and stock market returns. The researcher aimed at providing a framework of understanding how unsystematic risk could affect the returns of individual stocks using the direct method and determining the optimal portfolio size at NSE by applying the mean-variance model. The direct method involves measuring unsystematic risk using residuals of the factor models, CAPM, and FF-Factor model (1993). Estimation of expected returns for shareholders is among the most debated issues in the theory of finance. Markowitz (1952) argues that investors' risk appetite is averagely characterized by risk aversion. Sharpe (1964) predicted that a securities' expected return is a function of their risk using the CAPM. Fama & French (1992) developed a 3-factor model showing that risk-reward does not just depend on market risk as shown by CAPM but includes the company size and the relationship between market and book value. The study employed a multi-theoretical approach since CAPM was required to achieve the objective of determining the unsystematic risk values whereas MPT provided a framework for the development of portfolios as discussed in the subsections.

2.2.1 Capital Asset Pricing Model (CAPM)

The proponents of CAPM, that is, William Sharpe (1964) and John Lintner (1965) marked the emergence of this asset pricing theory. This financial model seeks to demonstrate beta as a

measure of the relationship between the risk of a stock and its return. This model is used to predict the equilibrium price of an asset. The beta measures the extent to which the value of the stock moves following the market such that when a beta is greater than 1 is an indication of risk higher than that of the market whereas less than one indicates risk lower than the market. Less risky assets had a lower beta and were discounted at a lower rate whereas more risky assets had a higher beta and were discounted at a higher rate. CAPM, therefore, suggests that an investor required a higher rate of return to hold a riskier asset. CAPM assumes that there are no transaction costs, the time horizon is one period, information efficiency, investors' expectations are homogenous, risk-free assets are present, CAPM shows a tradeoff between risk and the return. The standard CAPM assumes that the investor's preference is consistent with the mean-variance criterion, the trading assets markets are in equilibrium and homogeneous beliefs, and absence of information asymmetries. The model includes the propositions that investors require a return above the risk-free rate to compensate them for holding market risk, they require no premium for bearing firm-specific risk since it can be eliminated by diversification and required higher returns for higher risk (Sharpe, 1964)

The model establishes a relationship between the return of a security, risk-free return, and average market return expressed as;

$$E(r_{it}) = r_{f_t} + \beta_{im} (r_{m_t} - r_{f_t}) + e_t \quad \text{Where,}$$

r_{it} is the asset i expected return of in time t , r_{f_t} is the risk-free rate in time t , r_{m_t} is the market average return at time t , β_{im} is the beta and $r_{m_t} - r_{f_t}$ is the equilibrium of the market, e_t is the pricing residual of unsystematic risk such that its standard deviation is the unsystematic risk.

In verification of the validity of the model, empirical tests indicate a problem such that when estimating coefficients of the equation for a large number of securities or portfolios, a statistically significant constant that is different from zero appears. Lo & MacKinlay, (2002) demonstrate that this appearance indicates the possibility of a model that is not well specified as it could be lacking factors that explain the excess return of assets. However, MacKinlay, (1995) suggests that deviations that appear are explained by sources not based on risk hence the pricing models with various factors may not necessarily explain deviations in the original CAPM. Capital Asset Pricing Model links together non-diversifiable risk and returns and is concerned

with the measurement of systematic risk and its effects on the required returns and security values. Three variables, that is, the risk-free rate that is prevailing, the co-efficient of firm-specific risk, and the return expected for taking risk were taken into consideration when developing the model.

However, some underlying assumptions such as the ability to borrow without limitations at the risk-free rate and absence of taxes have made this model subject to debate by financial studies. The notion of beta not being the only factor in the determination of stock returns has greatly taken shape. The CAPM states that beta is the only determinant of expected returns. Pontiff, (2006) reveals the importance of unsystematic risk since risk aversion, the alpha of the position, and the position's unsystematic risk are functions of the optimum weight of an asset hence it is not affected by other equity positions.

This theory is used to construct unsystematic risk as to the standard deviation of the error term e_t . Cakici, Yan & Zhang, (2005) used this model to construct unsystematic risk and they demonstrate that the results obtained using either CAPM or Fama & French 3-factor model (1993) are similar. Guo & Savickas (2008); Mehra, Wahal & Xie, (2021) also provide evidence of the same, thus this research focused only on this model.

2.2.2 Modern Portfolio theory

This theory of finance was put forth by Markowitz in 1952 in an attempt to explain the maximization of the expected return of a portfolio for a particular level of unsystematic risk through the selection of various proportions of assets. This theory is a mathematically formulated concept of diversification, that is based on the mean-variance analysis model, to select a portfolio of securities that lower the risk of any individual securities (Markowitz, 1952). It is used to derive the expected return of a portfolio and the expected risk measure. According to Reilley & Brown, (2012), Markowitz, under a reasonable set of assumptions revealed that the variance of the rate of return was a meaningful measure of portfolio risk hence deriving the formula for computing the variance of a portfolio. This theory assumes that investors care for risk over a single period of holding, they maximize the utility of one-period with curves indicating diminishing marginal utility, they estimate the risk of a portfolio by the variability of the returns expected, base decisions mainly on the returns they expect and the risk, and for a given amount

of risk, investors prefer returns that are higher to those that are lower returns and for a given level of returns and lower risk to higher risk. When investors consider the mean-variance criteria, they combine the market portfolio and risk-free security in their structure choice of a portfolio (Reilley & Brown, 2012).

However, many real financial problems don't fit the assumption of a single holding period that is, pension or insurance problems. Merton, (1971) considered multi-period planning and portfolio strategy by an investor but his solution required an investor to have log utility consumption with constant relative risk aversion equal to one. Diversification reduces unsystematic risk and different assets often change in value in opposite directions such as stock markets and bond markets. This theory portrays returns of assets as a normally distributed function and defines risk as to the standard deviation and models portfolios as a combined weight of asset returns (Elton, 2010). The portfolio's return is the mean of the returns expected of comprising securities whereas risk is measured as the variance of the returns of assets. MPT reduces portfolio variance and assumes that investors are rational and that markets are efficient. A study by Elton, (2010) suggests that the covariance contribution between different pairs of individual assets to the variance of the portfolio increases with the number of assets while Jorion & Khoury, (1996) suggest that variance of the portfolio gradually approaches average covariance which is the portfolio's minimum.

The portfolio's expected return ($E(R_p)$) is measured as the weighted average of expected rates of return of individual assets making up the portfolio, such that;

$$E(R_p) = \sum_{i=1}^n W_i R_i$$

Where W_i = Weight of asset i

R_i = Expected rate of return of asset i

The covariance of returns and correlation coefficient are important in defining the variance of returns of a portfolio. Covariance measures the movement of two variables concerning their average values over time such that when the covariance is positive, it is an indication that the pair's rates of return move in the same direction while a negative one indicates movement in different directions. (Reilley & Brown, 2012)

For two assets:

$$Cov_{ij} = \{(R_i - E(R_i))(R_j - E(R_j))\}$$

The variability of individual returns indices affects covariance hence it is standardized by the product of individual assets standard deviations to yield a coefficient of correlation that is varied in the range of negative one(-1) to a positive one(+1). The coefficient of correlation (r_{ij}) is determined as;

$$r_{ij} = \frac{Cov_{ij}}{\sigma_i \sigma_j}$$

A correlation coefficient of +1 shows a perfect positive linear relationship since the movement of assets is linear whereas a value of -1 indicates a perfect negative movement such that if one asset's return rate is above its average, the other would be below by a comparable amount. The formula for standard deviation according to Markowitz is as follows;

$$\sigma_p = \sqrt{\{\sum_{i=1}^n w_i^2 \sigma_i^2 + \sum_{i=1}^n \sum_{j=1}^n w_i w_j cov_{ij}\}} \quad i \neq j$$

The portfolio standard deviation is a function of the weighted average of individual variances and the weighted covariance between all the assets of the portfolio. For a portfolio with a large number of securities, the formula reduces to the sum of weighted covariance (Reilley & Brown, 2012).

Markowitz (1952) also introduced the concept of an efficient frontier. A portfolio that has the best-expected return for its given level of risk is efficient. According to Sharpe & Alexander, (1990) the efficient frontier is the portion of the opportunity set that offers the highest expected return for a given level of risk. Investors chose optimal portfolios from sets of differing amounts of risk and minimum risk for differing levels of expected return thus forming a portfolio referred to as an efficient set or efficient frontier. A set of all attainable portfolios combinations with their expected returns and standard deviations make the opportunity set for the investor (Sharpe & Alexander, 1990). Huni & Sibindi, (2020) studying the feasibility of constructing optimal portfolios using securities at the Johannesburg Securities Exchange using the Mean-Variance framework confirmed the feasibility of the model.

The Modern portfolio theory provides a mathematical link between the risk diversification concept and the selection of a portfolio of stocks thus linking the expected return of portfolios to the risk. The theory shows the importance of diversification in the reduction of the unsystematic risk of portfolio investments. It is therefore important to this study.

2.3 Empirical Review

The relationship between risk and return is well established such that higher risk leads to a higher expected return Stultz (1984). Stock prices are subject to the unsystematic risk of the company which would lead to losses in a case where an investor invested only in one company. Diversification helps reduce this risk in that when an investor has more than 30 stocks in a portfolio from different sectors, unsystematic risk has been diversified away.

Standard asset pricing models suggest that firm-specific risk is priced at equilibrium. The literature on asset pricing model validity aims at determining the multiple systematic factors that can be incorporated into risk premium and asset prices. There is however a possibility of pricing unsystematic risk at equilibrium leading to demand a systematic risk premium to bear it. Capital asset pricing theories suggest that unsystematic risk plays no role in explaining the pricing of stocks as it is eliminated through effective diversification hence expected stock returns are a function of systemic factors. The findings of unsystematic risk being a significant predictor of future stock returns or risk being priced cross-sectional can be reconciled if the unsystematic risk is representative of factors of systematic risk (Angelidis & Tessaromatis, 2008). Goyal & Santa-Clara, (2003) show background risk and lack of diversification as the representative of unsystematic risk. Brown & Ferreira (2004) suggest that unsystematic risk could be representative of liquidity and business cycle risk, whereas Drew, Naughton, and Veeraraghavan (2004) reveal that unsystematic risk is priced and that both firm-specific risk and size of the firm may be representative of systematic risk.

A study by Campbell et al. (2001) rekindled interest in the study of unsystematic risk, its forecasting ability, and its role in asset pricing. By studying the risk of individual stocks and focusing on the empirical study of unsystematic risk, Campbell et al. (2001) used monthly data for the period between 1962 and 1997 and the study revealed that average unsystematic risk is an important component of total risk. Xu and Malkiel (2001) Empirically studied to examine whether there exists a cross-sectional relationship between unsystematic risk and firm returns.

Brandt, Brav, Graham & Kumar (2009) studied the time trend analysis of unsystematic risk and revealed that time-series behavior of unsystematic volatility reflected a seasonal event more than a trend that occurs over time and that this seasonal unsystematic volatility expressed strongly among stocks that are low priced which are held by many retail investors rather than institutional investors thus the unsystematic risk does not show any significant trend. Fazil & Ipek (2013) studied the Istanbul Stock exchange for the period 2007 to 2010 and revealed that there's unsystematic volatility that does not exhibit a general trend. Studying the trend of unsystematic risk in the Kenyan stock market is beneficial since many investors holding individual stocks will be in a better position to make investment decisions based on the result of this trend analysis. An upward trend could make an investor demand compensation for the growing risk whereas a downward trend would inform the investor of reduced returns according to the proposition by Merton (1987) stating that when investors do not diversify properly, then firm-specific risk should be rewarded with higher expected returns

2.3.2 Forecasting Ability of Unsystematic Risk on stock returns

According to the CAPM, the expected returns are determined by systematic risk factors since unsystematic risk can be diversified away by holding a portfolio of securities. However, investors do not always hold a portfolio of stocks and thus they are exposed to systematic risk. A study by Barber & Odean, (2000) on preferences of stocks for individual investors reveals that they hold portfolios with an average of 3 to 4 stocks due to overconfidence which results in high trading frequencies and poor performance of these portfolios. A study on decisions on portfolio selection of retirement accounts in the American market by Banartzi & Thaler, (2001) shows an equal division of wealth by investors characterized by picking insignificant points in the efficient frontier and investment proportion dependent on stock funds in their plan. they

Goetzmann & Kumar, (2004) examined if the diversification decisions of individual investors affect stock prices and revealed that most individual investors are under diversified and that those who prefer skewness exhibit familiarity bias and greater overconfidence thus more than a quarter of 62000 examined households hold only one stock. Hence, unsystematic risk is a factor that would affect the returns of an asset (Malkiel & Xu, 2006). Merton (1987) demonstrates that high firm-specific risk assets have higher returns than assets with low firm-specific risk since investors cannot create a portfolio that includes only market risk. The existing evidence of how

firm-specific risk and returns of securities in developed stock markets are confusing and conflicting. For instance, a study of the US market by Goyal & Santa Clara, (2003) in establishing whether an unsystematic risk can predict the returns on the stock market show a positive relationship between average unsystematic risk and future returns with persistence after controlling for macroeconomic variables that are known to forecast stock markets, whereas Kearney & Poti, (2008) when examining whether unsystematic risk, systematic risk and return correlate in the European equity market over the period between 1974 and 2004 show a negative relationship between unsystematic risk and returns. Wei & Zhang, (2005) re-examined the relationship between average returns and volatilities using extended sample periods and suggested no time-series relationship between unsystematic risk and future returns thus the proclaimed positive relationship was not substantiated

Angelidis and Tessaromatis, (2009) studied the intertemporal relationship between unsystematic risk and stock returns employing a regime-switching model that accommodated instability of the forecasting relation and revealed that future market returns were positively related to unsystematic risk during periods of low volatility coinciding with the sample of Goyal & Santa-Clara (2003). Guo & Savickas, (2006) studied unsystematic risk, market risk, and stock returns revealing that unsystematic risk predicted stock market returns thus it could be used as a measure of a risk factor that is omitted by the CAPM, and the negative relation between unsystematic risk and book-to-market ratio which is positively related to stock market returns results to a negative relationship between unsystematic risk and future returns. Bozhkov, Lee, Sivarajah, Despoudi & Nandy (2020) using the mean-reverting volatility model, examined whether the unsystematic risk is priced by the stock markets and the probable of mixed evidence in the US markets and revealed that one-period volatility forecasts are not significantly related to with stock market returns whereas a stronger correlation between unsystematic risk and stock returns during recessions suggest interaction of risk premium with decreased risk tolerance or other considerations in investments. Gitari (1990) studied the risk-return relationship on the Kenyan Stock market revealing a statistically insignificant negative relationship between unsystematic risk and stock returns.

2.3.3 Relationship between unsystematic risk and returns in forming an optimum portfolio

Unsystematic risk is useful to the performance of portfolio managers. Understanding the properties of unsystematic risk is quite helpful as it affects portfolio management decisions since an increase in unsystematic risk lowers correlations in stock returns. According to APT, unsystematic risk is the standard deviation of residuals of the FF-factor(1996) model and should not be priced. According to Mehra et al., (2021) high average unsystematic risk results in the high marginal benefit of diversification, thus implying a lower risk premium. A study by Huni & Sibindi, (2020) on the feasibility of constructing optimal portfolios using securities at the Johannesburg Securities Exchange using the Mean-Variance framework confirmed the feasibility of the model and revealed that mean-variance efficient portfolios yield diversification benefits despite their positive correlation with one another. However, a study by Merton (1987) revealed that when investors are not able to effectively diversify, unsystematic risk should be rewarded. This implies that unsystematic risk in a portfolio should be positively related or irrelevant to the expected return. Ang. et al (2006) showed that volatility of market returns should be priced as a risk factor in asset portfolios. Campbell, et al.(2001) reveal that twenty securities reduce excess standard deviation by 0.1 in the year 1985 but fifty stocks achieve the same level of risk in the 1990s. Kearny & Poti(2008) revealed that a portfolio of thirty-five stocks was needed to reduce unsystematic risk in 1974 whereas, in the year 2003, a portfolio of one hundred and sixty-six stocks was needed at the European Securities market to achieve the same result. A study by Xu (2003) examining diversification benefits in china revealed that more stocks were needed to achieve a given level of risk.

Empirical studies have indicated varying optimal portfolio sizes, between 10 – 50 securities. Evans & Archer, (1968) examined the variation of the level of returns concerning diversification for randomly selected portfolios using a sample of 470 securities and revealed that a portfolio consisting of 10 different stocks was sufficiently diversified. Fisher & Lorie, (1970) examined the frequency distributions of wealth ratios in different sized portfolios of stocks listed at NYSE using the mean-variance model and found that reduction of dispersion is achieved at 40% by holding 2 stocks, 80% with eight stocks, 90% with 32 stocks and 99% with 128 stocks. Further studies on well-diversified portfolios have been done with Tsui, Low, and Kwok, (1983) employing data for 40 stocks listed on Singapore Securities Exchange using the mean-variance model and found that 40 randomly selected securities in a portfolio gave a well-diversified

portfolio. A recent study by Ahuja, (2011) on portfolio diversification at Karachi Stock Exchange used a mean-variance model and daily returns of 15 randomly selected securities and demonstrates that 10 securities can diversify away a significant amount of risk. Rani, (2013) investigated the relationship between portfolio size and risk in the Indian stock market applying the mean-variance optimization model, using 11 years revealing that a well-diversified portfolio fell between the range of 20 – 30 securities.

Research on the Kenyan stock market has been inconclusive. According to Nyaraji, (2001) a significant risk reduction is achieved by holding a portfolio size of 13 securities after which risk reduction becomes insignificant. This study was based on the benefits of portfolio diversification at NSE for the period 1996 to 2000 and 49 companies listed at NSE were studied. Another study by Kamanda (2001) on quoted equity portfolios held by Kenyan insurance companies revealed that these portfolios were poorly diversified and performed much worse than the market portfolio. A study by Kisaka et al, (2015) on optimal portfolio size at NSE, employing 60 listed companies revealed that an optimal portfolio size comprised of between 18 and 22 securities.

2.4 Gaps in Research

Whereas significant research has been done to establish the relationship between unsystematic risk and stock returns in the Kenyan stock market, the available evidence on unsystematic risk is inconclusive. Critical factors such as the forecasting ability of unsystematic risk, the trend of unsystematic risk, and the optimal portfolio size at NSE differ from one period to another in previous research. The trend of unsystematic risk in the Kenyan stock market has limited evidence as to the forecasting ability of unsystematic risk. There is no consensus on the optimal portfolio size for investors as it differs from one period to another in the same market as the market develops. Investors make their decisions based on the available evidence and inconclusive or limited evidence is confusing to the investor hence affects the decision-making power of the investor. The purpose of this study was to examine the relationship between unsystematic risk and stock returns in the Kenyan market with a focus on companies listed at NSE. This study focused on value-weighted measures on unsystematic risk and also focused on optimal portfolio size at NSE. This research focus was on NSE since it is not sufficiently covered by the current literature. The researcher aims at contributing to the gap of research conducted on the risk-return relationship of unsystematic risk and stock returns by providing more empirical

evidence on this relationship. The table below provides a matrix capturing studies, findings, research gaps and how the study sought to fill these gaps.

Table 2.1 Research gaps Matrix

Study	Finding	Research Gap and how the study will fill it
Duffee(1995)	Unsystematic risk revealed a trend	Gap is on applicability of this conclusion at NSE. To fill this gap, the study sought to determine the trend of unsystematic risk at NSE.
Campbell(2001)	Increasing trend of unsystematic risk	Gap is on whether unsystematic risk shows an increasing trend at NSE. To fill this gap, the study sought to determine the trend of unsystematic risk at NSE.
Xu & Malkiel (2003)	Increasing trend due to institutional ownership	Gap is on applicability of this conclusion at NSE. To fill this gap, the study sought to determine the trend of unsystematic risk at NSE.
Wei & Zhang (2006)	Increasing trend due to increase in volatility firm fundamentals	Gap is on applicability of this conclusion at NSE. To fill this gap, the study sought to determine the trend of unsystematic risk at NSE.
Brandt, Bray, Graham & Kumar (2009)	No significant trend	Gap is on whether unsystematic risk shows a significant trend at NSE. To fill this gap, the study sought to determine the trend of unsystematic risk at NSE.
Fazil & Ipek (2003)	No general trend	Gap is on applicability of this conclusion at NSE. To fill this gap, the study sought to determine the trend of unsystematic risk at NSE.
Bozhkov, Lee, Sivarajah, Despoudi & Nandy (2020)	Insignificant relationship between unsystematic risk and stock returns	The Gap is on whether there exists a relationship between unsystematic risk and returns at NSE and further implications of this relationship. This study sought to assess if unsystematic risk can be applied in forecasting.
Malkiel & Xu, (2006)	Unsystematic risk	Gap is on the implication of unsystematic risk on returns

	affects returns of stocks	at NSE. This study sought to determine this through studying the relationship.
Goyal & Santa Clara, (2003)	Positive relationship between unsystematic risk and future returns in the US market	Gap is on whether this is the case with emerging capital markets. This study contributes by studying the relationship between unsystematic risk and stock return in the Kenyan stock market.
Guo & Savickas, (2006)	Unsystematic risk predicts future returns	Gap is on predictability of future returns at NSE using unsystematic risk. This study sought to determine the forecasting ability of unsystematic risk on stock returns.
Kearney & Poti, (2008)	Negative relationship between unsystematic risk and returns in European market.	Gap is on whether this is the case with emerging capital markets. This study contributes by studying the relationship between unsystematic risk and stock return in the Kenyan stock market as an emerging capital market
Angelidis and Tassaromatis, (2009)	Positive relationship between IV and stock returns	Gap is on applicability of this conclusion at the Kenyan Stock market. This study sought to determine the relationship between these variables at NSE.
Wei & Zhang (2005)	No relationship between IV and stock returns	Gap is on applicability of this conclusion at the Kenyan Stock market. This study sought to determine the relationship between these variables at NSE.
Gitari (1990)	Insignificant negative relationship in the Kenya stock market	Gap is on whether this is still the case considering significant changes in stock market environment. This study studied the most recent period capturing significant market changes at NSE.
Huni & Sibindi, (2020)	Mean-variance efficient portfolios yield diversification	The gap is on the applicability of the Mean-variance model in determining the optimum portfolio at NSE and its significance despite presence of correlation. This study

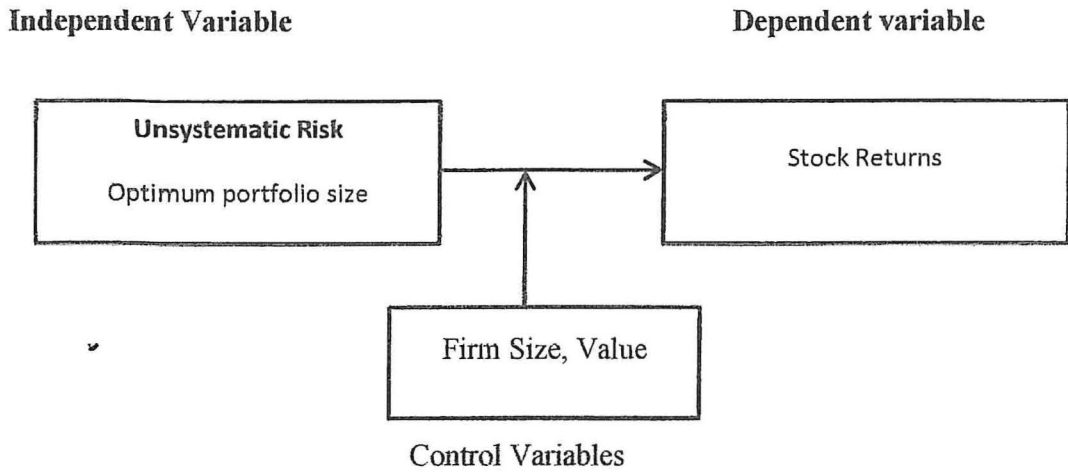
	benefits despite their positive correlation with one another.	applied mean-variance model in developing an optimum portfolio at NSE.
Campbell (2001)	20 stocks needed to reduce risk by 0.1 in 1985 but 50 to achieve the same level by 1990	Gap is on whether there is presence of this change over significant time period at NSE. The study fills this gap by studying the recent data and compares it with past studies.
Kearny & Poti(2008)	35 stocks were needed to achieve maximum diversification in 1974 while 160 were needed to achieve the same in 2003 in European market.	Gap is on whether there is presence of this change over significant time periods. The study fills this gap by studying the recent data and compares it with past studies.
Ahuja, (2011)	A portfolio of 10 stocks can diversify away a significant amount of risk using random selection.	Gap is whether this conclusion is applicable in the Kenyan Stock market. This study sought to determine the number of securities that can diversify away a significant amount of risk at NSE.
Rani, (2013)	Studied the Indian stock market and concluded that a well-diversified portfolio consisted of 20-30 stocks.	Gap is whether this conclusion is applicable in the Kenyan Stock market. This study sought to determine the number of securities that comprise of a well-diversified portfolio at NSE.
Nyaraji, (2001)	13 stocks needed to	Gap is on whether this is applicable even after many years

	achieve an optimum portfolio at NSE	of significant changes at NSE. This study sought to fill gap by studying the recent data at NSE.
Kisaka,(2015)	Used random selection and revealed that an optimum portfolio comprised of between 18-22 stocks at NSE	Gap is on whether this is conclusion applicable using purposive sampling technique. This study sought to fill gap by studying the optimum portfolio using purposive sampling and further gives a comparison of results.

2.5 Conceptual Framework of unsystematic risk and stock returns

The conceptual framework explains the relationship between the variables to be studied. Risk is the possibility of deviation from the standard path (Gupta 2004). It is therefore a variable that can impact the outcome of an event positively or negatively. Nath and Brooks (2015) found unsystematic risk stronger than the risk of beta or firm size. Firm size is positively correlated with stock returns after controlling for unsystematic risk thus unsystematic risk is one of the important variables that affect the stock price. The research aimed at analyzing unsystematic risk by attempting to understand the role it plays in the returns of a security. Unsystematic risk is the independent variable and stock return is the dependent variable. Firm size and value are the control variables since they have a direct implication on the relationship and may have an effect on the outcome. Firm value is used in the development of value-weighted unsystematic risk. Figure 2.1 presents the conceptual framework.

Figure 2.1: Conceptual framework of unsystematic risk and stock returns



2.6. Operationalization of variables

This section presents the measurements used to operationalize the variables

Table 2.2 Operationalization of Variables

Variable	Category	Measure	Reference
Unsystematic Risk	Independent	1. $r_t^i = \alpha^i + \beta_{MKT}^i MKT_t + \varepsilon_t^i$	CAPM , Leite et al., (2016) Angelidis, (2010)
		2. $IV_t = \sum_{i=1}^N w_{i,t} \sqrt{n_t} \sqrt{Var(\varepsilon_{t,i})}$	
		$\sigma_{port} = \sum_{i=1}^N \sum_{j=1}^N w_i cov(i,j) w_j$ (Optimum portfolio)	Cleary & Copp, 1999
Stock returns	Dependent	$R_{yt} = \frac{P_{yt} - P_{yt-1}}{P_{yt-1}}$ - Return, $\bar{R} = \frac{1}{n} \sum_{t=1}^n R_t$ - Mean security Return	Wang (2014)
Firm Size & Value	Control	Market Capitalization (Size), Book to the Market ratio (value)	Ang et al, (2009), Leite et al, (2016)

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter gives the research methodology used in this study which includes the research philosophy and design, population and sampling, data collection methods, data analysis method, research quality, and ethical considerations.

3.2 Research Philosophy

A research philosophy focuses on how things are perceived in the world (Yin, 2009). The focus of the research philosophy is to further assess the assumptions that support the research strategy adopted along with the practical experiences, relationship to knowledge, and the process through which they are formed in real-life situations (Saunders, 2009).

This study adopted a positivism research philosophy which is an empirical, quantitative approach that uses hypothesis testing to discover facts generalizable to the population. Positivism adheres to the view that factual knowledge that is gained through observation and measurement is trustworthy and the researcher's role is limited to objective data collection and interpretation. Positivists believe that truth is facts that can be proven or disproven, the reality is not different for each person, and observations and measures tell us what the reality is. According to Bryman (2008), positivism has four characteristics namely, phenomenalism, that is, knowledge confirmed by science can be warranted as knowledge; objectivity, meaning that science must be conducted in a value-free way; inductivism, meaning that knowledge is gained through the gathering of facts that provide the basis for laws and deductivism.

3.3 Research Design

The research design refers to the program of activities that guides the researcher in the process of collecting, analyzing, and interpreting observations (Kothari, 2004). This study adopted a quantitative research design. This design goes beyond description and attempts to explain the reasons for the phenomenon by finding a causal relationship. The merits of quantitative research design are control and precision thus a high level of control was maintained during and throughout the design and sampling process, associated with the precise quantitative measurements obtained (Masry & Menshawy, 2017). This design is more scientific since a large

amount of data is collected and analyzed statistically. The researcher has more control over data gathering and an outside perspective is gained and it can be replicated or repeated making it highly reliable as it is in the case of this study.

3.4 Population and Sampling

The population for the study comprised all 63 (sixty-three) listed firms in the Nairobi securities exchange (NSE 2019). The study adopted a total population sampling technique for all securities with complete information on prices over the study period between January 2010 to December 2019, that is, companies that have not been delisted or suspended from trading during the period of study and companies listed at the beginning of the period. The study period was selected to capture evidence of unsystematic risk over the past 10 years. Secondly, previous studies (Masry & Menshawy, 2017; Leite, Pinto & Klotzle, 2016; Heaton & Lucas, 2000) used a period of ten to eleven years to evaluate these strategies and thus provided a good basis to select the period of study. The study adopted purposive sampling to construct portfolios. Purposive sampling uses the judgment of a researcher in selecting cases with a specific purpose in mind. To achieve this, assets were arranged in ascending order based on their unsystematic risk values, and portfolios of an increasing number of securities were constructed based on the increasing order of their unsystematic risk value. Forty-four samples were drawn and their mean and variance of returns were averaged to give a representative portfolio risk. To avoid the undue bias of one or few securities in the results according to the law of large numbers and the minimum target population that meets this consideration is 40 companies (Kisaka et al., 2015).

3.5 Data Collection methods

The study used secondary data which was collected using a data capture sheet for the period from January 2010 to December 2019. The ten years were used to capture major factors in the economy that could affect stock returns and unsystematic risk. Data on daily stock prices, daily NASI index levels, market capitalization, and market to book value were obtained at NSE, Capital Markets Authority website, published company annual reports, newspapers, and periodicals on capital markets. The daily stock prices were converted to stock returns due to the non-stationary factor in stock prices. The 91-day Treasury bill rate which was obtained from the Central Bank of Kenya was used as a proxy for the risk-free rate.

Daily return of stock y is defined as a percentage change in prices on day t , such that,

$$R_{yt} = \frac{P_{yt} - P_{yt-1}}{P_{yt-1}} \dots\dots\dots (1)$$

Computed using period yield formula, where

P_{yt} is the price of stock y on day t and P_{yt-1} is the price of stock y on day t-1. This formula was applied to all objectives.

3.6 Data Analysis

This study adopted a direct method to study the relationship between unsystematic risk and stock returns (Leite et al., 2016). The direct method involves measuring unsystematic risk as residuals of CAPM. For developing an optimal portfolio, statistical measures of mean, variance, and standard deviation of returns were used. Diagnostic tests i.e. stationary tests, unit root, and autocorrelation were applied to check the state of data and the sustainability of the model.

3.6.1 Trend Analysis for Unsystematic risk

Unsystematic risk in regards to CAPM was calculated using the regression equation,

$$r_t^i = \alpha^i + \beta_{MKT}^i MKT_t + \varepsilon_t^i, \dots\dots\dots (2)$$

The unsystematic risk was measured as the standard deviation of the residuals, ε_t^i . Unsystematic risk (IV) and systematic risk (MV) in month t equal to $\sqrt{n_t} \sqrt{Var}(\varepsilon_{t,i})$ and $\sqrt{n_t} \sqrt{Var}(r_{t,m})$. The monthly weighted unsystematic risk is calculated as;

$$IV_t = \sum_{i=1}^N w_{i,t} \sqrt{n_t} \sqrt{Var}(\varepsilon_{t,i}), \dots\dots\dots (3)$$

Where $w_{i,t}$ is the market capitalization weight of stock i in month t-1 and n_t is the number of days in month t. The researcher then performed a trend analysis to determine the trend of the unsystematic risk for the study period.

3.6.2 Investigating forecasting ability of unsystematic risk

Goyal & Santa-Clara, (2003) regression model was employed to study whether the unsystematic risk is a significant predictor in forecasting future returns. The intertemporal relation between unsystematic risk and subsequent market returns was investigated using the following regression;

$$r_{t+1} = \alpha + \beta IV_t + \varepsilon_{t+1}, \dots\dots\dots (4)$$

Where, r_{t+1} is the log market monthly return at month t+1.

3.6.3 Determining optimum portfolio size using Mean-Variance Model

The study applied the mean-variance model (Cleary & Copp, 1999). According to Brealey & Myers, (1991) return and risk for each security was calculated by the formula;

$$R_t = \frac{(P_t - P_{t-1})}{P_{t-1}}, \dots \dots \dots (5)$$

Where, P_t is the price at the end of the period t, P_{t-1} is the price at the beginning of the period, R_t is the security return and D is the dividend paid over the period.

The mean security return is calculated as;

$$\bar{R} = \frac{1}{n} \sum_{t=1}^n R_t, \dots \dots \dots (6)$$

$$\text{Security Variance; } (\sigma^2) = \frac{1}{n} \sum_{t=1}^n (R_t - \bar{R})^2$$

$$\text{Security standard deviation } (\sigma) = \sqrt{\text{Var}}$$

Total market return = sum of all securities for the ten years

Average market return (\bar{R}_m) = Total market return/ Number of periods considered.

Security Covariance with the market;

$$(R_m R_i) = \frac{1}{n} \sum_{t=1}^n (R_m - \bar{R}_m)(R_i - \bar{R}_i), \dots \dots \dots (7)$$

Portfolio risk for Value weighted N-Security portfolio is given by;

$$\sigma_{port} = \sum_{i=1}^N \sum_{j=1}^N w_i \text{Cov}(i,j) w_j \dots \dots \dots (8)$$

$$\begin{aligned} \sigma_{port} = & (w21)(s21) + (w22)(s22) + (w23)(s23) + (w24)(s24) + (w25)(s25) \\ & + 2(w1)(w2)\text{Cov}1,2 + 2(w1)(w3)\text{Cov}1,3 + 2(w1)(w4)\text{Cov}1,4 \\ & + 2(w1)(w5)\text{Cov}1,5 + 2(w2)(w3)\text{Cov}2,3 + 2(w2)(w4)\text{Cov}2,4 \\ & + 2(w2)(w5)\text{Cov}2,5 + 2(w3)(w4)\text{Cov}3,4 + 2(w3)(w5)\text{Cov}3,5 \\ & + 2(w4)(w5)\text{Cov}4,5 \end{aligned}$$

W is the weight of the asset, N is the number of securities in the portfolio and the portfolio standard deviation is the square root of portfolio variance.

$$\sigma_p = \sqrt{\sigma_p^2}, \dots\dots\dots (9)$$

The portfolio standard deviation was plotted against the number of securities and the point at which the curve becomes asymptotic was the optimal portfolio size. Regression analysis was used at 95% confidence level and the model regression equation were;

$$Y = \beta \left(\frac{1}{x}\right) + A, \dots\dots\dots (10)$$

Where Y is portfolio standard deviation (risk), X is portfolio size, β is a parameter of the model and A is a constant. The portfolio standard deviation was regressed on the inverse of portfolio size.

3.7 Research Quality

The quality of data in any research is important and was determined through the data's internal and external validity and reliability (Lakonishok & Shapiro, 1986). Validity checks whether the tests are used to measure what they are supposed to measure (Kothari, 2004).

This study adopted a sampling method that ensured that most elements being examined were captured and that data collected was carefully analyzed to give accurate findings and ensure internal validity (Kothari, 2004). Diagnostic tests i.e. stationary tests, unit root, and autocorrelation were applied to check the state of data and the sustainability of the model. To have a true analysis of the variables, accurate prediction, and forecasting, a stationarity test was done to ensure that the data was free from the effects of trend and seasonality. Unit root test was used to determine whether the trending data would be first differenced, or regressed on deterministic functions of time to render data stationarity. In this case, unsystematic risk data was first differenced.

3.8 Ethical considerations

The study ensured that ethical standards were considered throughout the research process. The researcher ensured that there was a high level of confidentiality with the data collected, a true representation of the analyzed data and that the findings are used for academic purposes only.

Plagiarism was avoided and all work borrowed from other scholars was duly acknowledged. The researcher obtained approval from the Strathmore University Ethics review committee and a research permit from NACOSTI as provided in appendices, III, IV, and V.

CHAPTER FOUR

PRESENTATION OF RESEARCH FINDINGS AND ANALYSIS

4.1. Introduction

The general objective of this study was to determine the relationship between unsystematic risk and stock returns at the Nairobi securities exchange by examining the trend of unsystematic risk, the forecasting ability of unsystematic risk on stock returns, and determining the optimum portfolio of securities. The analysis is done as per the specific objective of the study. Section 4.2 presents the general information as far as the use of secondary data is concerned Section 4.3 presents the summary statistics, 4.4 presents the analysis of the trend of unsystematic risk at NSE, 4.5 presents the findings on the forecasting ability of unsystematic risk on stock returns, 4.6 presents the optimum portfolio at NSE and 4.7 presents the chapter summary.

4.2. General Information

To achieve the first objective of determining the trend of unsystematic risk, daily secondary data for Nairobi All Share Index (NASI), daily share prices, market capitalization, and the risk-free rate (Central bank of Kenya monthly treasury bill rates) for the study period between 2010 and 2019 were collected. The same data was applied in studying the second objective of the forecasting ability of unsystematic risk on stock returns and the third objective on the optimal portfolio size at NSE. The sample comprised 45 companies since any company suspended, listed, or delisted during the period was not considered for analysis. The list of companies included in the study is presented in appendix II and those excluded from the study are presented in appendix III. To calculate unsystematic risk, CAPM was used to control for unsystematic risk and the unsystematic risk was determined as the standard deviation of the residuals from the regression of excess returns (Angelidis and Andrikopoulos, (2010); Mehra, Wahal & Xie, (2021).

4.3 Descriptive statistics

4.3.1 Univariate Statistics

This table presents the annualized univariate statistics on Mean, Median, Standard deviation, Variance, Minimum, and Maximum on the value-weighted unsystematic risk (VWIV) and Stock market return values.

Table 4.1: Univariate statistics

Variable	VWIV	Stock Market return
Mean	-0.0010	-0.0201
Max	0.0018	0.6989
Min	-0.0157	-0.6699
Std. Dev	0.0088	0.4431
Variance	0.0001	0.1963
Median	0.0001	0.0207

4.3.2 Test for unit root

The study involved time series analysis with most estimators relying on data being stationary. The presence of a trend component would result in the series being non-stationary hence unit root tests were used to determine if trending data should be first differenced or regressed on deterministic functions of time to achieve stationarity. The presence of a deterministic trend might lead to spurious regressions hence for robustness the results were reported using differenced variables, integrated of order 1. The results of Augmented Dickey-Fuller and Philips Perron unit root tests for these differenced variables are;

Table 4.2: ADF and Philips Perron Unit root tests

	Augmented Dickey-Fuller Test		Philips Perron Test	
	VWIV	Market Returns	VWIV	Market Returns
Test Statistic	-5.189	-4.916	-4.892	-5.293
1% Critical Value	-3.750	-3.750	-3.750	-3.750
5% Critical Value	-3.000	-3.000	-3.000	-3.000
10% Critical Value	-2.630	-2.630	-2.630	-2.630
p-value	0.0000	0.0000	0.0000	0.0000

From this result, the null hypothesis of the unit root is rejected.

4.3.3 Test for Normality

To test for normality, skewness and kurtosis test was used. Skewness measures the asymmetry of the probability distribution of a random variable about its mean, while kurtosis represents the sharpness and height of the central peak relative to that of a standard bell curve.

Table 4.3: Result of Skewness and Kurtosis Tests

	VWIV	Market Returns
Pr(Skewness)	0.4906	0.8063
Pr(Kurtosis)	0.9136	0.5987
Adj chi2(2)	0.49	0.34
Prob >chi2	0.7827	0.8449

The probabilities of skewness are 0.4906 and 0.8063 for VWIV and Market Returns respectively, implying that skewness is asymptotically normally distributed since they are above 0.05. Similarly, Pr(Kurtosis) for both VWIV and Market returns are also asymptotically distributed since their p-values are above 0.05. Chi(2) values are greater than 0.05 for the two variables implying their significance at the 5% level. The probabilities are above 0.05 thus the null hypothesis cannot be rejected since residuals show normal distribution.

4.4 Trend of Unsystematic Risk for the period of 2010 to 2019 in the NSE

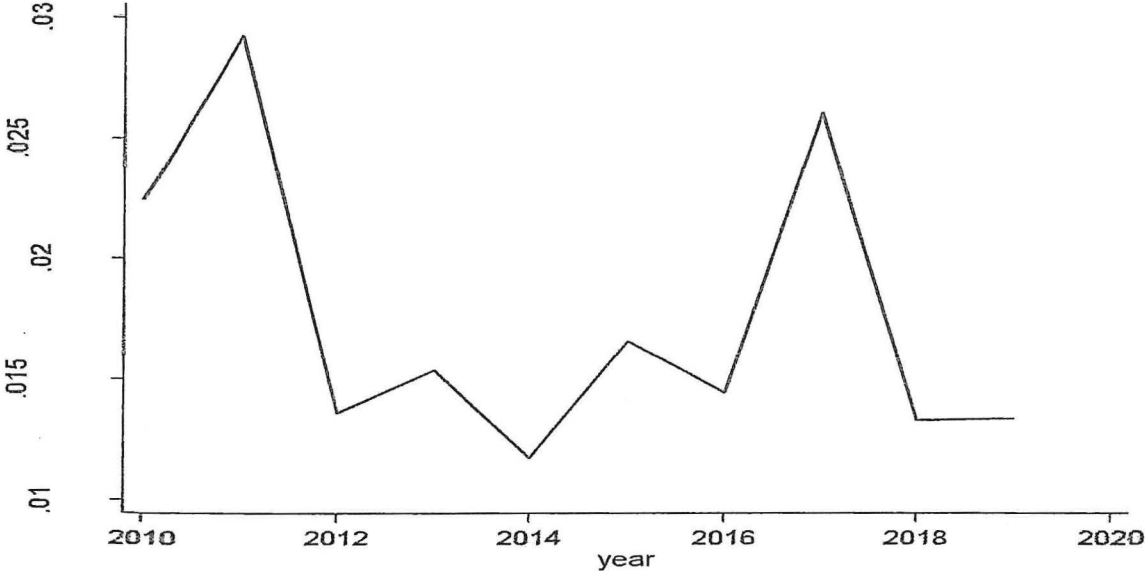
To study the first objective, value-weighted unsystematic risk values for the study period were determined. A unit root test was made on these values to analyze the trend since it aims at the investigation of time sequence trend characteristics of unsystematic risk from 2010 to 2019. Time sequences are stationary if their average, data and variables are stable over time (Masry & Menshawy, 2017). This is possible through Dickey & Fuller, (1979) and Philip Perron, (1988) unit root tests. The table below gives a summary of these tests.

Table 4.4: Time sequence stationary test

	Dickey-Fuller Test		Philip Perron Test	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend
t-stat	-4.97	0.72	-1.82	0.72
P-Value	0.004	0.504	0.129	0.504

T statistics exceed the tabula value hence they are statistically significant. The coefficient of the trend of the measures of unsystematic volatility is not statistically significant hence unsystematic risk does not have a rising or a falling trend in the period of 2010 to 2019. This finding of the trend of unsystematic risk is consistent with Fazil & Ipek, (2013) and Masry & Menshawy, (2017) findings which reported no significant trend of unsystematic risk in the Turkish and Egyptian Stock Exchange markets respectively.

Figure 4.1. The annualized trend of unsystematic risk



The graph presents the annualized value-weighted unsystematic risk values (y-axis) plotted against time (x-axis) for the study period between 2010 and 2019 using Stata software. From the graph, there is no evidence of a trend of value-weighted unsystematic risk during the period of study.

From the analysis, the study reveals that there’s no significant trend of unsystematic risk throughout the study period at the Nairobi securities exchange.

4.5 Forecasting ability of unsystematic risk

In this section, the second objective which is measuring the ability of unsystematic risk in forecasting stock market returns is examined. The data that was applied in studying this objective

were unsystematic risk values and stock market return values. To achieve this, the researcher regressed capitalization-weighted excess stock market returns on unsystematic risk measures using the following equation.

$$r_{t+1} = \alpha + \beta X_t + \varepsilon_{t+1}$$

Where,

r_{t+1} is the excess return of the market at time t+1

X_t is the unsystematic risk

t = 2010:01, 2019:12

The results of the regression are presented in table 4.5 as follows;

Table 4.5: Forecasting stock returns using Value Weighted Idiosyncratic Volatility

Forecasting stock Returns		
t-stat	-0.51	
P-Value	0.6246	
R ²	0.036	
Adj-R ²	0.1017	
d-statistic	2.66	
Equations	Constant	VWIV
Co-efficient	-0.0296	-9.519
P-Value	0.855	0.625

From the table, the p-value is greater than 0.05 indicating that the relationship between the variables of the study is insignificant at a 5% confidence level. The d-statistic of 2.66 shows that there's no autocorrelation. The coefficient is negative thus the study revealed that value-weighted Unsystematic risk is negatively related to stock market returns and does not forecast stock market returns at NSE.

The study, therefore, concludes that there is a negative and insignificant relationship between value-weighted unsystematic risk and stock market returns. Value weighted unsystematic risk can therefore not be used in forecasting stock market returns at the Nairobi securities exchange.

4.6 Determining the optimum portfolio size for an investor at NSE

The third objective was to determine the optimum portfolio size at NSE. Unsystematic risk data, stock market data total of forty-five securities had complete information on the study period between 2010 and 2019 and were used for the study. The portfolios were constructed using the purposive sampling method, where the unsystematic risk for each security was determined as the standard deviation of the residuals of Capital Asset Pricing model regression. To calculate unsystematic risk, CAPM was used to control for unsystematic risk which was determined as the standard deviation of the residuals from the regression of excess returns. The Securities were then sorted in the ascending order of their unsystematic risk value as provided in table 4.7 and a total of 44 portfolios were constructed in increasing order of rank. The first portfolio comprising of two (2) securities and the last portfolio comprising of forty-five (45) securities. The first portfolio comprised of the first two securities with the least unsystematic risk values, the second portfolio with the first three securities with the least unsystematic risk, and consequently the same method was applied until the last portfolio comprising of all the securities was reached. As shown in appendix VII.

The portfolio returns were calculated as the total sum of value-weighted returns of each security in the portfolio. The portfolio risk was then determined as the standard deviation of the Value weighted returns of the Portfolio as provided in table 4.8.

Table 4.6 Securities Unsystematic risk, Average returns, and variance

No	Company	Unsystematic Risk(IV)	Average Return	Variance
1	SCOM	0.0453	0.0173	0.0042
2	EABL	0.0536	0.0045	0.0044
3	BAMB	0.0552	-0.0041	0.0035
4	Coop	0.0629	0.0106	0.0068
5	DTK	0.0664	0.0088	0.0045
6	ABSA	0.0670	0.0041	0.0071

7	JUB	0.0706	0.0148	0.0063
8	BAT	0.0716	0.0109	0.0044
9	CTUM	0.0730	0.0123	0.0083
10	TOTL	0.0782	0.0025	0.0065
11	SCBK	0.0787	0.0054	0.0046
12	KEGN	0.0801	-0.0035	0.0088
13	BOC	0.0802	-0.0048	0.0065
14	SBIC	0.0817	0.0121	0.0080
15	NCBA	0.0835	0.0106	0.0108
16	NMG	0.0852	-0.0036	0.0066
17	IMH	0.0855	0.0168	0.0061
18	TPSE	0.0867	-0.0031	0.0068
19	UNGA	0.0869	0.0147	0.0077
20	KPLC	0.0894	-0.0095	0.0082
21	CABL	0.0899	-0.0126	0.0084
22	KCB	0.0928	0.0125	0.0076
23	EQTY	0.0948	0.01517	0.0082
24	NBK	0.1019	-0.0103	0.0131
25	OCH	0.1025	-0.0057	0.0107
26	KNRE	0.1071	-0.0012	0.0122
27	SASN	0.1075	0.0110	0.0112
28	SLAM	0.1112	0.0074	0.0143
29	HFCK	0.1113	0.0001	0.0153
30	SMER	0.1115	0.0021	0.0137
31	CGEN	0.1127	0.0079	0.0116
32	MSC	0.1145	-0.0222	0.0147
33	XPRS	0.1193	0.0048	0.0136
34	KUKZ	0.1195	0.0258	0.0148
35	LIMT	0.1201	0.0147	0.0128
36	EVRD	0.1214	-0.0029	0.0159

37	SCAN	0.1216	0.0069	0.0136
38	KAPC	0.1233	0.0057	0.0149
39	PORT	0.1244	-0.0069	0.0153
40	WTK	0.1266	0.0112	0.0141
41	CRWN	0.1278	0.0243	0.0163
42	KQNA	0.1518	-0.02348	0.0231
43	UCHM	0.1663	-0.01831	0.0290
44	CARB	0.1699	0.0042	0.0277
45	EGAD	0.3007	0.0217	0.0904

The unsystematic risk column presents the unsystematic risk value for each asset, the average returns column presents the average returns of each asset throughout the study and the variance column presents the variance of each asset throughout the study between 2010 and 2019.

The unsystematic risk values for each security were determined as the standard deviation of the residuals of CAPM regression, which is the regression between excess stock returns and excess market returns. The average returns are the average of the returns for each security.

Table 4.7: Portfolio Size, Variance, and standard deviation

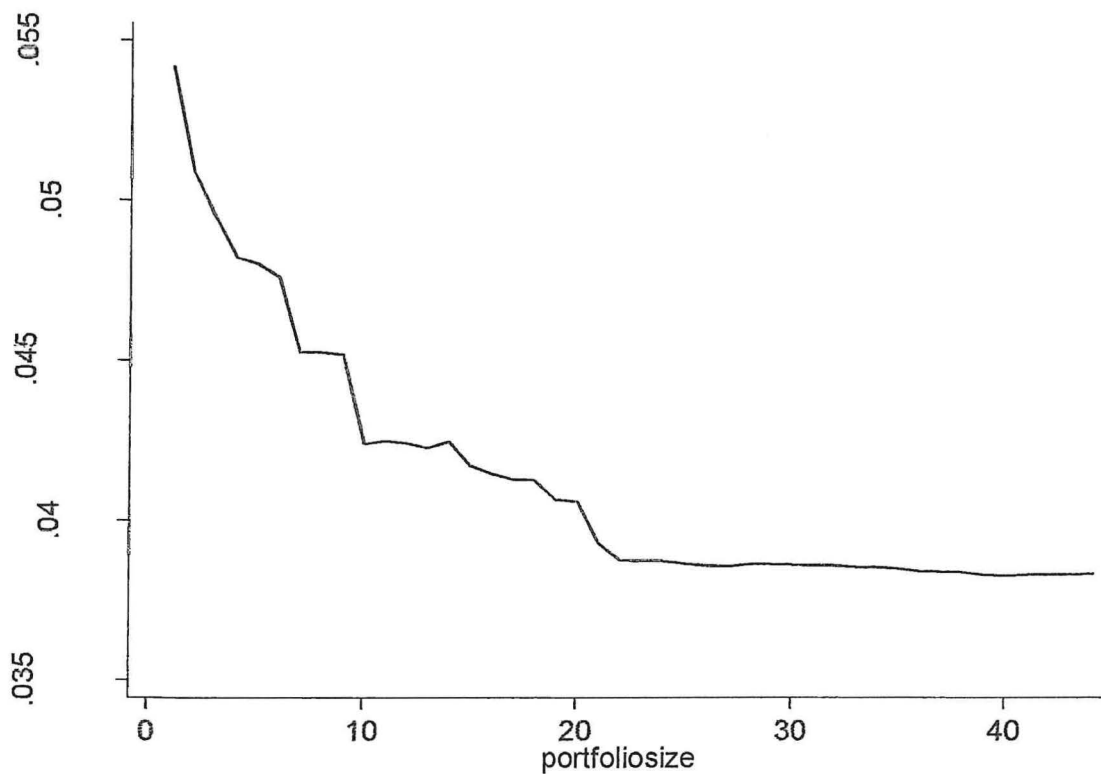
Portfolio Size	Value Weighted Variance	Portfolio Value Weighted Standard Deviation	% Risk Reduction
1	0.0029	0.0542	0.00%
2	0.0026	0.0509	6.10%
3	0.0025	0.0495	8.72%
4	0.0023	0.0482	11.06%
5	0.0023	0.0480	11.43%
6	0.0023	0.0476	12.19%
7	0.0021	0.0453	16.55%
8	0.0020	0.0453	16.53%
9	0.0020	0.0452	16.68%
10	0.0018	0.0424	21.85%
11	0.0018	0.0425	21.67%

12	0.0018	0.0424	21.78%
13	0.0018	0.0423	22.09%
14	0.0018	0.0425	21.72%
15	0.0017	0.0417	23.08%
16	0.0017	0.0415	23.55%
17	0.0017	0.0413	23.86%
18	0.0017	0.0413	23.92%
19	0.0017	0.0406	25.06%
20	0.0016	0.0406	25.15%
21	0.0015	0.0393	27.55%
22	0.0015	0.0387	28.59%
23	0.0015	0.0387	28.59%
24	0.0015	0.0387	28.60%
25	0.0015	0.0386	28.75%
26	0.0015	0.0386	28.88%
27	0.0015	0.0386	28.91%
28	0.0015	0.0386	28.79%
29	0.0015	0.0386	28.81%
30	0.0015	0.0386	28.85%
31	0.0015	0.0386	28.87%
32	0.0015	0.0386	28.88%
33	0.0015	0.0385	28.95%
34	0.0015	0.0385	29.02%
35	0.0015	0.0385	29.02%
36	0.0015	0.0384	29.21%
37	0.0015	0.0384	29.25%
38	0.0015	0.0383	29.29%
39	0.0015	0.0383	29.42%
40	0.0015	0.0382	29.49%
41	0.0015	0.0383	29.42%

42	0.0015	0.0383	29.41%
43	0.0015	0.0383	29.44%
44	0.0015	0.0383	29.35%

The study indicated portfolio risk reduction with an increase in the number of securities in the portfolio (diversification). The risk reduction rate is initially high with 27.55% of diversifiable risk being eliminated by holding a portfolio of twenty-one securities. This rate then lowers down with an additional 2% of diversifiable risk being eliminated with an increase from 22 to 45 securities. The plot in figure 4.2 shows that portfolio risk reduces to an asymptote as the number of securities is increased occurring at a portfolio size of between 17 and 22 securities.

Figure 4.2. Portfolio risk diversification at the Nairobi Securities Exchange



This graph presents the plot of portfolio risk (y-axis) and portfolio size (x-axis). From the graph, the study shows that portfolio risk reduces with an increase in the number of securities making

up the portfolio. This curve reaches an asymptote at between 17 to 22 securities thus forming our optimum portfolio size.

4.6.1 Empirical model in determining the optimum portfolio size

The results of the study indicate an inverse relationship between portfolio risk and size. This relationship was tested using the regression model;

$$Y = \beta \left(\frac{1}{x} \right) + A$$

Where Y is the portfolio risk, β is the parameter of the model, X is the portfolio size and A is the constant. The portfolio risk was regressed against the inverse of the portfolio size and the results are recorded in tables, 4.9, 4.10, and 4.11.

Table 4.8; Regression model goodness of fit statistics

Model	Multiple R	R ²	Adjusted R ²	Standard Error
$Y = \beta \left(\frac{1}{x} \right) + A$	0.9283	0.8617	0.8584	0.0015

The coefficient of determination (R²) indicates that 86.16% of portfolio risk reduction can be explained by an increase in the number of securities hence the model is a good fit.

Table 4.9; Analysis of Variance (ANOVA)

	<i>Df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.0006	0.0006	261.6299	0.0000
Residual	42	9.6967E-05	0.0000		
Total	43	0.0007			

The results show that portfolio size is significant in determining the level of portfolio risk with a significance level of less than 0.05.

Table 4.10; Regression Model coefficients

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.0382	0.0003	126.7879	0.0000
X Variable 1 (β)	0.0409	0.0025	16.1749	0.0000

With a significance level of less than 0.05, the coefficients in table 11 were fitted into the regression model resulting in the equation,

$$Y = 0.0409 \left(\frac{1}{x}\right) + 0.0382$$

An increase in the number of securities results in to decrease in the β component leading to a lower figure of portfolio risk Y. This is as a result of coefficient 0.040907677 is divided by larger figures as the number of securities (X) are increased. These results are similar to those of Kisaka, S. E., Kitur, H., & Mbithi, J. A. (2015)

The study indicates that an increase in the number of securities reduces the risk of unsystematic risk and that the optimum portfolio of securities can be achieved by holding a portfolio of between 17 and 22 securities.

4.7 Chapter Summary

The study sought to answer three objectives, the existence of unsystematic risk trend at NSE, the forecasting ability of unsystematic risk on stock returns at NSE and to determine the optimum portfolio size at NSE. From the analysis, the existence of an unsystematic risk trend has been confirmed to be insignificant throughout the study from 2010 to 2019. From this study, the forecasting ability of value-weighted unsystematic risk on stock market returns has also been confirmed to be insignificant hence value weighed unsystematic risk cannot be applied in the forecasting of stock returns. This could however change if different methodologies were applied. The unsystematic risk variable also portrays a negative relationship with stock market returns since from the regression analysis, their co-efficient is negative. On determining the optimum portfolio size at NSE, Unsystematic risk proves to provide a method in portfolio selection using purposive sampling instead of random sampling. This is because diversification aims at reducing firm-specific risk while maximizing returns thus it is an important component in portfolio selection choice. From the analysis, 27.55% risk reduction is achieved by holding a portfolio size

of 21 securities. Increasing the portfolio from 22 to 45 securities achieves only a 2% reduction in portfolio risk indicating that investors at NSE will get maximum diversification benefits by holding a portfolio of between 17 and 22 securities, as shown in table 4.8. The results of the analysis of optimum portfolio size are subject to the methodology applied in this study.

CHAPTER 5

DISCUSSIONS, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the discussions, conclusions, and recommendations of the study. It provides a discussion of the findings based on the objectives of the study in section 5.2, conclusions in 5.3, further studies in section 5.4, and the limitations of the study in section 5.5.

5.2 Discussion of findings

This section presents the discussion of findings based on the study. These findings are discussed according to the objectives of the study with section 5.2.1 discussing the finding on the objective, to determine the trend of unsystematic risk at NSE. The findings of the second objective, to determine the forecasting ability of unsystematic risk on stock returns is discussed in section 5.2.2 and the findings of the third objective on the optimum portfolio size at NSE are discussed in section 5.2.3.

5.2.1 Trend of unsystematic risk for the period between 2010 to 2019 at NSE

This study sought to examine the trend of value-weighted unsystematic risk. The Capital asset pricing model (CAPM) was employed in determining the values of unsystematic risk, thus providing an effective theoretical framework to achieving this objective. From the analysis of the study, value-weighted unsystematic risk exhibits an insignificant trend throughout the study. This is in agreement with the studies conducted by Guo & Savickas, (2006), Université d'Auvergne & Xiao, (2015), and Masry & Menshaw, (2017) which revealed that the trend coefficient of unsystematic risk is statistically insignificant hence, the conclusion that unsystematic risk does not show any significant trend. The analysis also agrees with the study by Brandt, Brav, Graham & Kumar (2009) which revealed that time-series behavior of unsystematic volatility reflected an episodic phenomenon more than a time trend and that this episodic unsystematic volatility is manifested more strongly among low priced stocks which are held proportionally more by retail investors than institutions hence, the unsystematic risk does not show any significant trend. On the contrary, the findings contradict the study by Campbell et al, (2001) which demonstrated that only unsystematic risk showed a significant upward trend during the period between 1962 to 1997, and the study by Duffee, (1995) which revealed a positive

skewness for firm volatility. From this study, there's no evidence that unsystematic risk shows a significant trend hence investors cannot rely on the trend of value weighted unsystematic risk at NSE to make investment decisions on expected returns.

5.2.2 Forecasting ability of Unsystematic risk on returns at NSE

In the second objective, the study sought to find out the relationship between unsystematic risk and stock market returns. The Capital asset pricing model was employed in determining the values of unsystematic risk, thus providing an effective theoretical framework to achieving this objective. This study revealed that value-weighted unsystematic risk is negatively related to stock market returns and does not forecast stock market returns. This is in agreement with the study by Gitari, (1990) which revealed a negative and insignificant relationship between unsystematic risk and returns in the Kenyan stock market. Similarly, a study by Guo & Savickas, (2008) revealed a negative and statistically insignificant relationship between value-weighted unsystematic risk and stock returns. A study by Kearney & Poti, (2008) in examining the dynamics of idiosyncratic risk, market risk, and return correlations in the European equity market revealed that average unsystematic risk is negatively related to future returns. Wei & Zhang, (2005) in re-examining the relationship between average returns and average volatilities argue that there's no time-series relation between unsystematic risk and future. Other studies by Masry & Menshawy, (2018) also reveal a negative and insignificant relationship between unsystematic risk and stock returns in the Egyptian Securities exchange concluding that unsystematic risk cannot be used for forecasting returns at ESE.

This is contrary to the study by Angelidis and Tassaromatis, (2009) which in forecasting relation between returns and unsystematic risk, and the study revealed that future market returns are positively related to unsystematic risk. The study also contradicts the study by Goyal & Santa Clara, (2003) on the predictability of stock market returns with risk measures which revealed that average unsystematic risk is positively related to future returns and that this relationship persisted even after controlling for macroeconomic variables known to forecast the stock market. However, from the analysis of this study, there's no significant relationship between value-weighted unsystematic risk and stock market returns at NSE hence value-weighted unsystematic risk cannot be used to forecast stock market returns at NSE.

5.2.3 The relationship between unsystematic risk and stock returns in determining the optimum portfolio

This objective sought to establish an optimum portfolio at NSE using a purposive sampling approach. The Modern portfolio theory provided a mathematical link between the risk diversification concept and the selection of a portfolio of stocks thus linking the expected return of portfolios to the risk. The Capital asset pricing model (CAPM) was employed in determining the values of unsystematic risk, thus providing an effective theoretical framework to achieving this objective. The unsystematic risk of each security was determined, and securities were arranged in ascending order of their unsystematic risk values. The portfolios were developed in increasing order of these securities and were value-weighted. The analysis of the study revealed that the portfolio risk is reduced by 27.55% by holding a portfolio of 21 securities and an additional 2% by holding a portfolio of between 22 to 45 securities. The graph in figure 3 becomes asymptotic at between 17 and 22 securities. The risk reduction achieved by 21 securities portfolio represents 93% of the risk reduction achieved by a 40 securities portfolio indicating substantial benefits of diversification. The analysis support early studies by Newbould & Poon, (1993) and Evans & Archer, (1968) that indicate that most diversification benefits are achieved by forming portfolios of between 8 to 20 securities. A study by Rani, (2013) used a mean-variance optimization model in the investigation of the relationship between portfolio size and risk in the Indian stock market, using 11 years, and revealed that a well-diversified portfolio fell between the range of 20 – 30 securities. Similarly, a study by Kisaka et al, (2015) on optimal portfolio size at NSE used equally weighted randomly selected portfolios, employing 60 listed companies revealed that an optimal portfolio size comprised of between 18 and 22 securities. This study reveals that an investor will enjoy maximum diversification benefits by holding a portfolio of between 17 and 22 securities. This study is in agreement with the findings of Humi & Sibindi, (2020) on the feasibility of constructing optimal portfolios using securities at the Johannesburg Securities Exchange using the Mean-Variance framework which confirmed the feasibility of the model and revealed that mean-variance efficient portfolios yield diversification benefits despite their positive correlation with one another. These findings agree with the modern portfolio theory which attempts to maximization of the expected return of a portfolio for a particular level of unsystematic risk through the selection of various proportions of assets. This finding is beneficial to institutional investors who can invest in large portfolios.

5.3 Conclusions

Investors continually seek a trade-off between risk and return leading to conflicting objectives of minimizing risk while maximizing expected returns. Diversification offers an opportunity to minimize one of the most important aspects of risk, which is an unsystematic risk. This study aimed at contributing to the existing information gap on the trend of unsystematic risk, the forecasting ability of unsystematic risk, and the role of unsystematic risk in determining the optimum portfolio size at Nairobi Securities Exchange. The study employed trend analysis to analyze the trend of equally-weighted unsystematic risk, regression analysis to determine the forecasting ability of unsystematic risk, and mean-variance analysis to determine the optimum portfolio of securities. Trend and forecasting are important to an investor as they enhance the predictability of returns. However, for this case, the study shows that they are insignificant and thus can be ignored by the investor. An optimum portfolio determines the number of securities an investor can hold to get diversification benefits. This study shows that purposive sampling by use of unsystematic risk values provides a more structured method of determining the securities to include in a portfolio, rather than random sampling. This study further proves that the Capital Asset Pricing model is relevant in the determination of unsystematic risk. The findings are also in agreement with the modern portfolio theory, thus making a theoretical contribution to the existing theories.

5.4. Recommendations per objective to beneficiaries identified in chapter 1

This section presents recommendations from the study. It is arranged according to the objectives of the study and the beneficiaries identified in chapter 1. The recommendations are as follows;

5.4.1 To determine the trend of unsystematic risk at NSE

For researchers, unsystematic risk and stock market returns have received considerable attention in research. This study contributes further to the existing body of knowledge as far as the trend of unsystematic risk is concerned. Researchers can therefore employ different methodologies to analyze the various aspects of unsystematic risk in seeking to identify the trend.

For policymakers, increase or decrease in firm-specific risk is dependent on firm-based factors and policymakers should strive to ensure that investors have confidence in the way listed firms operate since a positive attitude on corporate governance principles enhances the level of activity.

5.4.2 Forecasting ability of unsystematic risk on stock market returns

For researchers, this study contributes further to the existing body of knowledge as far as the forecasting ability of unsystematic risk and stock returns is concerned. This is an area that has gained interest in research in the past decade. Different methodologies can thus be applied to study this objective.

5.4.3 Determining the optimal portfolio size at NSE

For researchers, this study contributes to research on diversification and the role of unsystematic risk in developing optimum portfolios. More studies can be done to identify how risk can be merged with the investor's interests.

Practitioners such as portfolio managers are mandated to maximize the portfolio returns of their clients. This study provides a structured way of approaching unsystematic risk and can be used in making decisions in regards to minimizing risk. The overall portfolio risk and the firm-specific risk are key in making decisions regarding overall risk reduction.

5.5. Areas of Further Research

This study focused on the trend and forecasting ability of value-weighted unsystematic risk on returns of the Kenyan market. Other studies can be done in other markets to determine if the result is similar. It also focused on developing an optimum portfolio using value-weighted unsystematic risk. Further research can be conducted using equally weighted unsystematic risk to see if it obtains results the same as this study. A different methodology can also be applied in developing portfolios such as developing portfolios in increasing order of their descending order unsystematic risk values. The study focused on the behavior of unsystematic risk in general and company-specific. Further studies can be done on the behavior of unsystematic risk of portfolios of securities, classified by size. Research can also be done on the effects of event studies on this relationship.

5.6 Limitations of the study

The study was limited to a period of 10 years, between 2010 and 2019 implying that the periods prior and after were not considered thus the missing period effects cannot be ruled out. The study also considered one market, NSE thus the findings of the study cannot be used to conclusively make recommendations on other markets.

REFERENCES

- Aliu, F., Pavelkova, D., & Dehning, B. (2017). Portfolio risk-return analysis: The case of the automotive industry in the Czech Republic. *Journal of International Studies*, 10(4), 72–83. <https://doi.org/10.14254/2071-8330.2017/10-4/5>
- Ang, A., Hodrick, R. J., Xing, Y., & Zhang, X. (2009). High idiosyncratic volatility and low returns: International and further U.S. evidence. *Journal of Financial Economics*, 91(1), 1–23. <https://doi.org/10.1016/j.jfineco.2007.12.005>
- Angelidis, T., & Tessaromatis, N. (2008). Idiosyncratic volatility and equity returns: UK evidence. *International Review of Financial Analysis*, 17(3), 539–556. <https://doi.org/10.1016/j.irfa.2006.10.006>
- Angelidis, T., & Tessaromatis, N. (2009). Idiosyncratic risk matters! A regime-switching approach. *International Review of Economics & Finance*, 18(1), 132–141. <https://doi.org/10.1016/j.iref.2007.09.003>
- Asri, M., Ali, M., Habbe, A. H., & Rura, Y. (2017). Idiosyncratic Risk and Asset Pricing: Study at Companies Listed on Indonesia Stock Exchange. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2992184>
- Barber, B. M., & Odean, T. (2000). Trading Is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors. *The Journal of Finance*, 55(2), 773–806. <https://doi.org/10.1111/0022-1082.00226>
- Boitout, N., & Lupu, R. (2015). Persistent Impact of Macroeconomic Announcements in Financial Market Data. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2556336>
- Bora, B., & Adhikary, A. (2015). Risk and Return Relationship -An Empirical Study of BSE Sensex Companies in India. *Universal Journal of Accounting and Finance*, 7.

- Bozhkov, S., Lee, H., Sivarajah, U., Despoudi, S., & Nandy, M. (2020). Idiosyncratic risk and the cross-section of stock returns: The role of mean-reverting idiosyncratic volatility. *Annals of Operations Research*, 294(1–2), 419–452. <https://doi.org/10.1007/s10479-018-2846-7>
- Brandt, M. W., Brav, A., Graham, J. R., & Kumar, A. (2010). The Idiosyncratic Volatility Puzzle: Time Trend or Speculative Episodes? *The Review of Financial Studies*, 23(2), 863–899. <https://doi.org/10.1093/rfs/hhp087>
- Carman, P. (1997). *Quantitative Investing for the Global Markets: Strategies, Tactics, and Advanced Analytical Techniques*. Global Professional Publishing.
- Chen, Z., & Petkova, R. (2012). Does Idiosyncratic Volatility Proxy for Risk Exposure? *Review of Financial Studies*, 25(9), 2745–2787. <https://doi.org/10.1093/rfs/hhs084>
- Cox, L. A., & Griepentrog, G. L. (1988). Systematic Risk, Unsystematic Risk, and Property-Liability Rate Regulation. *The Journal of Risk and Insurance*, 55(4), 606. <https://doi.org/10.2307/253140>
- Duffee, G. R. (1995). Stock returns and volatility a firm-level analysis. *Journal of Financial Economics*, 37(3), 399–420. [https://doi.org/10.1016/0304-405X\(94\)00801-7](https://doi.org/10.1016/0304-405X(94)00801-7)
- Dybvig, P. H. (1988). Inefficient Dynamic Portfolio Strategies or How to Throw Away a Million Dollars in the Stock Market. *The Review of Financial Studies*, 1(1), 67–88. <https://doi.org/10.1093/rfs/1.1.67>
- Endress, T. (2018). “Deliberated Intuition” in Stock Price Forecasting. *Economics & Sociology*, 11(3), 11–27. <https://doi.org/10.14254/2071-789X.2018/11-3/1>
- Evans, J. L., & Archer, S. H. (1968). Diversification and the Reduction of Dispersion: An Empirical Analysis*. *The Journal of Finance*, 23(5), 761–767. <https://doi.org/10.1111/j.1540-6261.1968.tb00315.x>

- Fazil, Gökgöz & İpek, Altinta. (2013). Does Idiosyncratic Volatility Matter in the Emerging Markets? Istanbul Stock Exchange Evidence. *Journal of Economic Research*, 26, 133-150. <https://doi.org/10.1080/1331677X.2013.11517626>
- Fisher, L., & Lorie, J. H. (1970). Some Studies of Variability of Returns on Investments in Common Stocks. *The Journal of Business*, 43(2), 99–134. JSTOR.
- Gitari, A. (1990). An empirical investigation into the risk-return relationship among Kenyan publicly quoted companies [Thesis, Univesity Of Nairobi].
<http://erepository.uonbi.ac.ke/handle/11295/37737>
- Alok Kumar & William N. Goetzmann, 2003. "Diversification Decisions of Individual Investors and Asset Prices," *Yale School of Management Working Papers ysm441*, Yale School of Management.
- Goyal, A., & Santa-Clara, P. (2003). Idiosyncratic Risk Matters! *The Journal of Finance*, 34.
- Guo, H., & Savickas, R. (2006). Idiosyncratic Volatility, Stock Market Volatility, and Expected Stock Returns. *Journal of Business & Economic Statistics*, 24(1), 43–56.
<https://doi.org/10.1198/073500105000000180>
- Heaton, J., & Lucas, D. (2000). Portfolio Choice and Asset Prices: The Importance of Entrepreneurial Risk. *The Journal of Finance*, 55(3), 1163–1198.
<https://doi.org/10.1111/0022-1082.00244>
- Hotvedt, J. E., & Tedder, P. L. (1978). Systematic and Unsystematic Risk of Rates of Return Associated with Selected Forest Products Companies. *Journal of Agricultural and Applied Economics*, 10(1), 135–138. <https://doi.org/10.1017/S0081305200014242>
- Huni, S., & Sibindi, A. B. (2020). *An Application of The Markowitz's Mean-Variance Framework in Constructing Optimal Portfolios using the Johannesburg Securities Exchange Tradeable Indices*. 10(2), 17.

- Kamanda, S. N. (2001). *An Empirical Evaluation Of Equity Portfolios Held By Insurance Companies In Kenya* [Thesis, UoN]. <http://erepository.uonbi.ac.ke/handle/11295/103789>
- Kearney, C., & Potì, V. (2008). Have European Stocks Become More Volatile? An Empirical Investigation of Idiosyncratic and Market Risk in the Euro Area. *European Financial Management*, 14(3), 419–444. <https://doi.org/10.1111/j.1468-036X.2007.00395.x>
- Kisaka, S. E., Kitur, H., & Mbithi, J. A. (2015). Determining the Optimal Portfolio Size on the Nairobi Securities Exchange. *Research Journal of Finance and Accounting*, 17.
- Kulali, D. I. (2016). Portfolio Optimization Analysis with Markowitz Quadratic Mean-Variance Model. *European Journal of Business and Management*, 7.
- Leite, A. L., Pinto, A. C. F., & Klotzle, M. C. (2016). Effects of Idiosyncratic Volatility in Asset Pricing. *Revista Contabilidade & Finanças*, 27(70), 98–112. <https://doi.org/10.1590/1808-057x201501940>
- Luvisotti, N. (2013). Idiosyncratic Risk and Expected Stock Returns: *An Empirical Investigation on the GIPS Countries*. 63.
- Masry, M., & Menshawy, H. E. (2017). The Impact of Unsystematic Risk on Stock Returns in an Emerging Capital Markets (ECM's) Country: An Empirical Study. *International Journal of Financial Research*, 9(1), 189. <https://doi.org/10.5430/ijfr.v9n1p189>
- Mehra, R., Wahal, S., & Xie, D. (2021). Is idiosyncratic risk conditionally priced? *Quantitative Economics*, 12(2), 625–646. <https://doi.org/10.3982/QE1528>
- Mokta Rani Sarker, M. R. S. (2013). Markowitz Portfolio Model: Evidence from Dhaka Stock Exchange in Bangladesh. *IOSR Journal of Business and Management*, 8(6), 68–73. <https://doi.org/10.9790/487X-0866873>

- Ngugi, W., Njuguna, A., & Wambalaba, F. (2018). The Influence of Pension Scheme Maturity on Investment Strategies of Pension Funds in Kenya. *International Journal of Business and Management*, 13(10), 1. <https://doi.org/10.5539/ijbm.v13n10p1>
- Obi, B., Oluseyi, A. S., & Evans, O. (2018). Impact of Oil Price Shocks on Stock Market Prices Volatility in Nigeria: *New Evidence from a Non-linear ARDL Cointegration*. 14(3), 18.
- Robert, M. (1987). A Simple Model of Capital Market Equilibrium with Incomplete Information—MERTON - 1987—*The Journal of Finance*—Wiley Online Library. <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1540-6261.1987.tb04565.x>
- Schwartz, E. S., & Ingersoll, J. E. (1988). Theory of Financial Decision Making. *The Journal of Finance*, 43(1), 259. <https://doi.org/10.2307/2328335>
- Sehgal, S., & Garg, V. (2016). Cross-sectional Volatility and Stock Returns: Evidence for Emerging Markets. *Vikalpa: The Journal for Decision Makers*, 41(3), 234–246. <https://doi.org/10.1177/0256090916650951>
- Tseng, K.-C., Kwon, O., & Tjung, L. C. (2012). Time series and neural network forecast of daily stock prices. *Investment Management and Financial Innovations*, 9(1), 24.
- Wei, S. X., & Zhang, C. (2005). Idiosyncratic risk does not matter: A re-examination of the relationship between average returns and average volatilities. *Journal of Banking & Finance*, 29(3), 603–621. <https://doi.org/10.1016/j.jbankfin.2004.05.021>

APPENDICES

Appendix I: Listed Companies at Nairobi Securities Exchange

AGRICULTURAL	COMMERCIAL AND SERVICES
Eaagads Ltd Ord 1.25 AIM	Deacons (East Africa) Plc Ord 2.50AIMS
Kakuzi Plc Ord.5.00	Eveready East Africa Ltd Ord.1.00
Kapchorua Tea Co. Ltd Ord Ord 5.00 AIM	Express Kenya Ltd Ord 5.00 AIMS
The Limuru Tea Co. Plc Ord 20.00AIMS	Kenya Airways Ltd Ord 5.00
Sasini Plc Ord 1.00	Longhorn Publishers Plc Ord 1.00AIMS
Williamson Tea Kenya Ltd Ord 5.00 AIM	Nairobi Business Ventures Ltd Ord. 1.00
AUTOMOBILES & ACCESSORIES	GEMS
Car & General (K) Ltd Ord 5.00	Nation Media Group Ltd Ord. 2.50
	Sameer Africa Plc Ord 5.00
	Standard Group Plc Ord 5.00
BANKING	TPS Eastern Africa Ltd Ord 1.00
ABSA Bank Kenya Plc Ord 0.50	Uchumi Supermarket Plc Ord 5.00
BK Group Plc Ord 0.80	WPP Scangroup Plc Ord 1.00
Diamond Trust Bank Kenya Ltd Ord 4.00	Safaricom Plc
Equity Group Holdings Plc Ord 0.50	CONSTRUCTION & ALLIED
HF Group Plc Ord 5.00	ARM Cement Plc Ord 1.00
I&M Holdings Plc Ord 1.00	Bamburi Cement Ltd Ord 5.00
KCB Group Plc Ord 1.00	Crown Paints Kenya Plc Ord 5.00
National Bank of Kenya Ltd Ord 5.00	E.A.Cables Ltd Ord 0.50
NIC Group Plc Ord 5.00	E.A.Portland Cement Co. Ltd Ord 5.00
Stanbic Holdings Plc ord.5.00	
	INSURANCE
ENERGY & PETROLEUM	Britam Holdings Plc Ord 0.10
KenGen Co. Plc Ord. 2.50	CIC Insurance Group Ltd ord.1.00
Kenya Power & Lighting Co Ltd Ord 2.50	Jubilee Holdings Ltd Ord 5.00
Kenya Power & Lighting Co Ltd 4%	Kenya Re Insurance Corporation Ltd Ord 2.50
Kenya Power & Lighting Co Ltd 7%	Liberty Kenya Holdings Ltd Ord.1.00

Total Kenya Ltd Ord 5.00	Sanlam Kenya Plc Ord 5.00
Umeme Ltd Ord 0.50	
	INVESTMENT
INVESTMENT SERVICES	Centum Investment Co Plc Ord 0.50
Nairobi Securities Exchange Plc Ord 4.00	Home Afrika Ltd Ord 1.00
	Kurwitu Ventures Ltd Ord 100.00
	Olympia Capital Holdings ltd Ord 5.00
	Trans-Century Plc Ord 0.50AIMS

Appendix II: List of Companies included in the sample

No	Company	Name
1	SCOM	Safaricom Plc
2	EABL	East African Breweries Limited
3	BAMB	Bamburi Cement
4	Coop	Co-operative Bank of Kenya
5	DTK	Diamond Trust Bank
6	ABSA	ABSA Bank
7	JUB	Jubilee Holdings Ltd
8	BAT	British American Tobacco
9	CTUM	Centum Investment Company
10	TOTL	Total Kenya Ltd
11	SCBK	Standard Chartered Bank of Kenya
12	KEGN	KenGen Company
13	BOC	BOC Kenya Ltd.
14	SBIC	CfC Stanbic Holdings Ltd
15	NCBA	NCBA Bank Ltd
16	NMG	Nation Media Group
17	IMH	I & M Holdings Limited
18	TPSE	TPS East Africa Ltd
19	UNGA	Unga Ltd.
20	KPLC	Kenya Power and Lighting Company
21	CABL	East African Cables Ltd
22	KCB	Kenya Commercial Bank
23	EQTY	Equity Bank
24	NBK	National Bank of Kenya
25	OCH	Olympia Capital Holdings Ltd
26	KNRE	Kenya Reinsurance Corp ltd
27	SASN	Sasini Ltd
28	SLAM	Sanlam Kenya
29	HFCK	HF Group Ltd
30	SMER	Sameer Africa
31	CGEN	Car & General Kenya Ltd
32	MSC	Mumias Sugar Company Ltd
33	XPRS	Express Kenya Ltd
34	KUKZ	Kakuzi Ltd
35	LIMT	Limuru Tea Company Ltd
36	EVRD	Eveready East Africa Ltd
37	SCAN	SCAN Group Ltd
38	KAPC	Kapchorua Tea Company Ltd
39	PORT	East African Portland Cement Company
40	WTK	Williamson Tea Kenya

41	CRWN	Crown Berger Ltd
42	KQNA	Kenya Airways
43	UCHM	Uchumi ltd
44	CARB	Carbacid Investments Ltd
45	EGAD	Eaagads Ltd

Appendix III: List of Companies not included in the study

1	Deacons (East Africa) Plc
2	Longhorn Publishers Ltd
3	Nairobi Business Ventures Ltd
4	ARM Cement
5	Britam Holdings
6	CIC Insurance Group Ltd
7	STANLIB Fahari
8	Flame Tree Group
9	Home Africa Ltd
10	Kenol Kobil Ltd
11	Liberty Kenya Holdings Ltd.
12	Nairobi Securities Exchange
13	Kenya Orchards Ltd
14	TransCentury Ltd
15	Umeme Ltd
16	Kurwitu Ventures Ltd
17	BK Group
18	Crown Paints Kenya

Appendix IV: Letter of Introduction

CIS Strathmore Rd, Macaocho Estate
P.O. Box 59457 Nairobi, Kenya
Cell: +254 701 413,672, Twitter: @SBSKenya
Email: info@sbs.ac.ke or visit www.sbs.strathmore.edu



20th April 2020

RE: FACILITATION OF RESEARCH – DANIEL OMERI

This is to introduce Daniel Omeri who is a Master of Commerce (MCOM) Student at Strathmore University Business School, admission number MCOM/113443. As part of our MCOM Program, Daniel is expected to do applied research and undertake a project. This is in partial fulfilment of the requirements of the MCOM course. To this effect, Daniel would like to request for appropriate data from your organization.

Daniel is undertaking a research paper on **“The Relationship between Unsystematic Risk and Returns in the Kenyan Stock Market.”** The information obtained shall be treated confidentially and shall be used for academic purposes only.

Our MCOM seeks to establish links with industry, and one of these ways is by directing our research to areas that would be of direct use to industry. We would be glad to share our findings with you after the research, and we trust that you will find them of great interest and of practical value to your organization.

We appreciate your support and shall be willing to provide any further information if required.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Caroline Tiara'.

Caroline Tiara
Manager – Graduate Programs.

Association of African
Business Schools



Strathmore Business School is a Proud member of:



AACSB

Appendix V: Ethical Approval Letter



19th May 2020

Mr Omeri, Daniel
daniel.omeri@strathmore.edu

Dear Mr Omeri,

RE: Relationship Between Unsystematic Risk and Returns in The Kenyan Stock Market

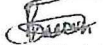
This is to inform you that SU-IERC has reviewed and **approved** your above research proposal. Your application approval number is SU-IERC0802/20. The approval period is 19th May 2020 to 20th May 2021.

This approval is subject to compliance with the following requirements:

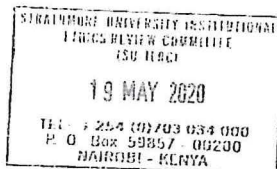
- i. Only approved documents including (informed consents, study instruments, MTA) will be used
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-IERC.
- iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-IERC within 72 hours of notification
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-IERC within 72 hours
- v. Clearance for export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days upon completion of the study to SU-IERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://oris.nacosti.go.ke> and also obtain other clearances needed.

Yours sincerely,







Dr. Virginia Gichuru,
Secretary; SU-IERC

Cc: Prof Fred Were,
Chairperson; SU-IERC



Ole Sangale Rd, Madaraka Estate PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email info@strathmore.edu www.strathmore.edu

Appendix VI: Research Permit License

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 235633	Date of Issue: 23/May/2020
RESEARCH LICENSE	
	
<p>This is to Certify that Mr. Daniel Nyangwono Omeri of Strathmore University, has been licensed to conduct research in Nairobi on the topic: <i>The Relationship between Unsystematic Risk and Returns in The Kenyan Stock Market</i> for the period ending : 23/May/2021.</p>	
License No: NACOSTI/P/20/5062	
235633 Applicant Identification Number	 Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
	Verification QR Code 
<p>NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.</p>	

Appendix VII: List of portfolios and their security component

Portfolio No	Securities
1	SCOM EABL
2	SCOM EABL
3	SCOM EABL
4	SCOM EABL
5	SCOM EABL
6	SCOM EABL
7	SCOM EABL
8	SCOM EABL
9	SCOM EABL
10	SCOM EABL
11	SCOM EABL
12	SCOM EABL
13	SCOM EABL
14	SCOM EABL
15	SCOM EABL
16	SCOM EABL
17	SCOM EABL
18	SCOM EABL
19	SCOM EABL
20	SCOM EABL
21	SCOM EABL
22	SCOM EABL
	BAMB BAMB
	Coop Coop
	DTK DTK
	ABSA ABSA
	JUB JUB
	BAT BAT
	CTUM CTUM
	TOTL TOTL
	SCBK SCBK
	KEGN KEGN
	BOC BOC
	SBIC SBIC
	NCBA NCBA
	NMG NMG
	IMH IMH
	TPSE TPSE
	UNGA UNGA
	KPLC KPLC
	CABL CABL
	KCB KCB
	EQTY

