

2017

**DETERMINANTS OF THE USE OF FINANCIAL
DERIVATIVES AMONG FIRMS LISTED AT NAIROBI
SECURITIES EXCHANGE**

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PHD

DOCTOR OF PHILOSOPHY

(Business Administration)

**JOMO KENYATTA UNIVERSITY OF
AGRICULTURE AND TECHNOLOGY**

2017

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**Determinants of the Use of Financial Derivatives among Firms Listed at
Nairobi Securities Exchange**

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**A Thesis Submitted in Partial Fulfillment for the Degree of Doctor of
Philosophy in Business Administration in the Jomo Kenyatta University of
Agriculture and Technology**

2017

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university

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DEDICATION

This thesis is dedicated to my mother, the late AMBIYA JEHOW OMAR, who held my hand and took me to school while she herself never had the chance to pursue any formal learning. I am forever grateful to her for enabling me to access knowledge and all the opportunities that came with it.

Further dedication is to my wife, and partner, DEKA MUHUMED AHMED, of over two decades for her love, patience, support and encouragement during the period of my studies. Dedication also goes to my sons; DHULKIFLI, DHULQARNAIN, SHUAIB and HADY.

ACKNOWLEDGEMENTS

I thank Allah, the Lord of the Universe, for giving me health, strength and perseverance to undertake this thesis.

The preparation of this work required cooperation and collaboration of many people and institutions. I am grateful to the entities that enabled me produce this important thesis by lending me their resources and time in the period of the study. Particularly, I would like to express my gratitude to my supervisors, Dr. Mouni Gekara and Prof. Willy Muturi for making this a meaningful learning process. Their guidance and encouragement throughout the course and their ability to view things pragmatically was critical and priceless to the success of this study and deserves a commendation. I am also grateful to the lecturers, coordinators and staff of JKUAT CBD Campus for facilitating the PhD programme efficiently. My gratitude also goes to my classmates for the ideas, criticism and motivation in tackling the various parts of this thesis.

My gratitude also goes to Africa Education and Development Trust (AEDT) for awarding me the grant that enabled me to pursue and complete this thesis.

TABLE OF CONTENTS

DECLARATION.....	II
DEDICATION.....	III
ACKNOWLEDGEMENTS	IV
TABLE OF CONTENTS	V
LIST OF TABLES	IX
LIST OF FIGURES	XII
ACRONYMS AND ABBREVIATIONS.....	XIII
DEFINITIONS OF TERMS	XV
ABSTRACT.....	XVI
CHAPTER ONE	1
INTRODUCTION.....	1
1.1 Background to the Study	1
1.2 Statement of the Problem	8
1.3 Objectives of the Study.....	9
1.3.1 General Objective	9
1.3.2 Specific Objectives	9
1.4 Hypothesis of the Study.....	10
1.5 Significance of the Study.....	11
1.6 Scope of the Study.....	13
1.7 Limitations of the Study	13
CHAPTER TWO	15
LITERATURE REVIEW	15
2.1 Introduction	15
2.2 Theoretical Review.....	15
2.2.1 Agency Theory	17

2.2.2 Risk Management Theories	18
2.3 Conceptual Framework.....	21
2.4 Empirical Review	24
2.4.1 Derivative usage	27
2.4.2 Firm Value	30
2.4.3 Debt	33
2.4.4 Tax Incentive	36
2.4.5 Underinvestment.....	39
2.4.6 Managerial Ownership	42
2.4.7 Firm Size.....	44
2.4.8 Industry Type.....	46
2.5 Summary of the Literature.....	49
2.6 Research Gaps	50
CHAPTER THREE	52
RESEARCH METHODOLOGY	52
3.0 Introduction	52
3.1 Research Philosophy.....	52
3.2 Research Design	53
3.3 Population.....	55
3.4 Sampling Frame.....	57
3.5 Sample Size and Sampling Technique	57
3.6 Data Collection Instruments	60
3.7 Data Collection Procedures	61
3.7.1 Secondary Data.....	62
3.7.2 Primary Data.....	63
3.8 Pilot Test.....	63
3.8.1 Reliability	65
3.8.2 Validity	66
3.9 Data Processing and Analysis.....	67
3.9.1 Introduction	67

3.9.2 Descriptive Analysis.....	67
3.9.2 Inferential Analysis.....	68
3.9.3 Operationalization of Variables.....	74
CHAPTER FOUR.....	76
RESEARCH FINDINGS AND DISCUSSION.....	76
4.1 Introduction	76
4.2 Response Rate.....	76
4.3 Sample Profile	77
4.4 Descriptive Results	79
4.4.1 Descriptive Results for Derivative Use Among Firms Listed at NSE	79
4.4.2 Descriptive Results for Debt.....	92
4.4.3 Descriptive Results for Firm Value	94
4.4.4 Descriptive Results for Underinvestment.....	96
4.4.5 Descriptive Results for Managerial Ownership.....	98
4.4.6 Descriptive Analysis for Tax Incentive	100
4.5 Inferential Analysis.....	101
4.5.1 Independent T-Test.....	101
4.5.2 Correlation Analysis	106
4.5.3 Logistic Regression Analysis	109
4.6 Combined Effects Model for the Determinants of Derivatives use Among Firms Listed at The Nairobi Securities Exchange	131
4.6.1 Logistic Regression for all Variables	131
4.6.2 Logistic Regression for Moderation effects of firm characteristics on determinants of derivative use (Moderated Model)	135
4.7 Discussion of significant findings	141
CHAPTER FIVE	145
SUMMARY, CONCLUSION AND RECOMMENDATIONS	145
5.3 Introduction	145
5.2 Summary of Findings	145

5.2.1 The Effect of Debt on Derivatives use	147
5.2.2 The Effect of Firm Value on Derivatives use.....	147
5.2.3 The Effect of Underinvestment on Derivatives use.....	148
5.2.4 The Effect of Managerial Ownership on Derivatives use	148
5.2.5 The Effect of Tax Incentive on Derivatives use	149
5.2.6 Moderating Effect of Firms' Characteristics on the Determinants of Derivatives Use	150
5.3 Conclusions	151
5.3.1 Debt and Derivative use	151
5.3.2 Firm Value and Derivative use.....	151
5.3.3 Underinvestment and Derivative use.....	151
5.3.4 Managerial Ownership and Derivative use	152
5.3.5 Tax Incentive and Derivative use	152
5.3.6 Moderating Effects of firm's Characteristics on Determinants of Derivative use	153
5.4 Recommendations	153
5.4.1 Debt and Derivative Use.....	154
5.4.2 Firm Value and Derivative Use	154
5.4.3 Underinvestment and Derivative Use.....	155
5.4.4 Managerial Ownership and Derivative Use.....	155
5.4.5 Tax Incentive and Derivative Use	155
5.4.6 Moderating Effects of Firm Characteristics on Derivative Use	156
5.5 Suggestions for Further Research.....	156
REFERENCES.....	158
APPENDICES.....	167
Appendix I: Introduction Letter.....	167
Appendix II: Questionnaire	168
Appendix III: Firms Listed at Nairobi Securities Exchange	180
Appendix III: Firms Listed at Nairobi Securities Exchange	181
Appendix IV: Secondary Data.....	184

LIST OF TABLES

Table 3.1: Target Population	56
Table 3.2: Sample Distribution for Firms	59
Table 3.3: Sample Distribution for Respondents.....	60
Table 3.4: Distribution of Annual Reports Sample across Industry	63
Table 3.5: Measurement of Reliability Results.....	66
Table 3.6: Firm Size Categorization for Moderation Analysis.....	73
Table 3.7: Industry Classification for Moderation Analysis.....	73
Table 3.8: Variables and their proxies and measures	75
Table 4.1: Response Rate.....	77
Table 4.2: Gender Profile of the Sample	78
Table 4.3: Respondents Experience in the Firm	78
Table 4.4: Respondents Experience in Industry	79
Table 4.5: Hedging strategies for financial risk management	81
Table 4.6: Reasons for hedging with derivatives.....	82
Table 4.7: Level of concern on issues relating to hedging with derivatives	84
Table 4.9: How often companies transact currency derivative contracts to hedge exposures	86
Table 4.10: How often companies transact interest rate derivative contracts to Hedge Exposures....	87
Table 4.11: Commodity Price Derivatives Use	88
Table 4.12: Important reason for not using commodity price derivatives	88
Table 4.13: Sources of Derivative Instruments.....	89
Table 4.14: Methods of evaluating riskiness of Portfolio.....	90
Table 4.15: Group Statistics for Debt	93
Table 4.16: Group Statistics for Firm Value.....	95
Table 4.17: Group Statistics for Underinvestment	97

Table 4.18: Group Statistics for Managerial Ownership	99
Table 4.19: Group Statistics for Tax Incentive	100
Table 4.20: Independent Samples Test for Debt proxies	102
Table 4.21: Independent Samples Test for Firm Value Proxies	103
Table 4.22: Independent Samples Test for Underinvestment Proxies	104
Table 4.23: Independent Samples Test Managerial Ownership Proxies	105
Table 4.24: Independent Samples Test for Tax Incentive Proxies	106
Table 4.25: Pearson Correlations Test for Debt.....	107
Table 4.26: Pearson Correlation Test for Firm Value.....	107
Table 4.27: Pearson Correlation Test for Underinvestment	108
Table 4.28: Pearson Correlation Test for Managerial Ownership	109
Table 4.29: Classification Table ^{a,b} of the baseline model.....	111
Table 4.30: Baseline Model Equation.....	111
Table 4.31: The Score Test: Variables not in the baseline Equation	112
Table 4.32: Full Model Classification Table ^a	112
Table 4.33: Logistic Regression results for the influence of Debt in the use of derivatives	114
Table 4.34: Classification Table ^{a,b} of the Baseline Model.....	115
Table 4.35: The baseline Model Equation	116
Table 4.36: The Score Test: Variables not in the Equation	116
Table 4.37: Full Model Classification Table ^a	117
Table 4.38: Logistic Regression Results for influence of firm value in the use of derivatives	119
Table 4.39: Classification Table ^{a,b} of the Baseline Model	120
Table 4.40: The Baseline Model Equation	121
Table 4.41: The Score Test: Variables not in the Equation	121
Table 4.42: Full Model Classification Table ^a	122

Table 4.43: Logistic Regression Results for underinvestment as determinant of derivative use	123
Table 4.44: Full Model Classification Table ^a	124
Table 4.45: The Baseline Model Equation	125
Table 4.46: The Score Test: Variables not in the Baseline Equation	125
Table 4.47: Classification Table ^a of the Full Model	126
Table 4.48: Logistics Regression Results for Managerial Ownership.....	127
Table 4.49: Baseline Model Classification Table ^{a,b}	128
Table 4.50: Baseline Model Equation.....	129
Table 4.51: The Score Test: Variables not in the baseline Equation	129
Table 4.52: Full Model Classification Table ^a	130
Table 4.53: Logistics Regression Results for effect of Tax Incentive on Derivative Use	131
Table 4.54: Classification Table ^a	133
Table 4.55: Logistic Regression Results for the Combined Effects Model (Overall model)	134
Table 4.56: Variables not in the Equation	135
Table 4.57: Comparison of Model Summary	136
Table 4.58: Classification Table ^a for Moderated Model.....	137
Table 4.59: Logistic Regression for Moderation Effect of Industry on determinants of derivative use	138
Table 4.60: Comparison Model Summary	139
Table 4.61: Classification Table ^a	140
Table 4.62: Logistic Regression for Moderation Effect of Firm Size on determinants of derivative use	140

LIST OF FIGURES

Figure 2.1: Conceptual Framework	23
Figure 3.1 Moderator Model (Baron & Kenny, 1986)	72

ACRONYMS AND ABBREVIATIONS

AAPOR	:	American Association for Public Opinion Research
BVA	:	Book Value
BVD	:	Book value of Debt
BVS	:	Book Value of Sales
CAPM	:	Capital Asset Pricing Model
CEOs	:	Chief Executive Officers
CMA	:	Capital Markets Authority
DPS	:	Dividend Per share
DU	:	Derivative User
DV	:	Dependent Variable
EBIT	:	Earnings Before Interest and Taxes
EPS	:	Earnings Per Share
EXP	:	Exponent
FV	:	Firm Value
GEMS	:	Growth Enterprise Market Segment
IAS	:	International Accounting Standards
IFRS	:	International Financial Reporting Standards
INT	:	Interest
IV	:	Independent Variable
MBV	:	Market To Book value
MKT	:	Market
MM	:	Modigliani and Miller
MO	:	Managerial Ownership

NDU	:	Non-Derivative User
NPV	:	Net Present Value
NSE	:	Nairobi Securities Exchange
OLS	:	Ordinary Least Squares
OTC	:	Over The Counter
R&D	:	Research and Development
SE	:	Standard Error
UK	:	United Kingdom
US	:	United States of America

DEFINITIONS OF TERMS

Derivatives: A security whose price is dependent upon or derived from one or more underlying assets (Chance & Brooks, 2008).

Exposure: The quantified potential for loss that might occur as a result of some activity. An analysis of the risk exposure for a business often ranks risks according to their probability of occurring multiplied by the potential loss, and it might look at such things as liability issues, property loss or damage, and product demand shifts (Hull, 2006).

Financial Risk Management: Financial risk management is the practice of creating economic value in a firm by using financial instruments to manage exposure to risk, particularly credit risk and market risk. (Hull, 2006)

Forwards: A non-standardized contract between two parties to buy or to sell an asset at a specified future time at a price agreed upon today (Copeland, Weston, Shastri, & Katz, 2005).

Futures: A financial contract obligating the buyer to purchase an asset, or the seller to sell an asset, such as a physical commodity or a financial instrument, at a predetermined future date and price (Copeland, Weston, Shastri, & Katz, 2005).

Hedging: Hedging means taking investment position with the objective of offsetting a potential loss or gain that may result from an investment. In simple language, a hedge is used to reduce any substantial losses/gains suffered by an individual or an organization (Ross, 1999).

Options: A contract that gives its holder the right, but not the obligation, to purchase or sell a specified number of shares of the underlying asset at the given strike price, on or before the expiration date of the contract (Ross, 1999).

Underinvestment: Conditions under which firm's equity-holders forego positive NPV projects because of concern on wealth transfer to debt-holders (Myers, 1977).

Spot Contract: An agreement to buy or sell an asset on the date of the agreement. (Copeland, Weston, Shastri, & Katz, 2005).

ABSTRACT

This study sought to investigate the determinants of derivative use among firms listed at the Nairobi Securities Exchange. Specifically, the study tests the effects of firm value, debt, underinvestment, managerial ownership and tax incentive on use of financial derivatives. The study also tests if industry and firm size have moderating effect on the determinants of derivative use. Each of the variables was analyzed using proxies identified through examination of existing theoretical framework. The study employed exploratory research design. Purposive sampling was applied to the target population of firms listed at the Nairobi Securities Exchange in order to achieve appropriate sample for the study. Banks, Financial Institutions and Investment firms were eliminated from the sample because most of them are market makers and their stimulus to use financial derivatives is unlike the motivations of non-financial firms. A total of 31 companies were included in the sample. Both primary and secondary data was used in the study. Primary data was obtained through a survey of firms listed at Nairobi Securities Exchange by means of questionnaires mailed to managers involved in risk management. A total of 62 questionnaires were administered and 57 were returned making the response rate to be 91.9%. Secondary data was generated from annual reports of firms listed in the Nairobi Securities Exchange from 2008 to 2012, total dataset of 155 firm-year observations. Data was analyzed using both descriptive and inferential techniques. Independent sample t-test was used to test differences in means between groups and Pearson's correlation was used to test for correlation between the variables. Binary Logistic Regression was applied since the dependent variable is dichotomous, small, discrete and non-continuous. Moderating effects of industry and firm size on determinants of financial derivative use were analyzed by including interaction term in the model. The findings reveal that Firm Value, Underinvestment and Managerial Ownership are statistically significant determinants of derivative use among firms listed at the Nairobi Securities Exchange. Evidence shows that Debt and Tax Incentive are statistically insignificant. From the findings, the study concludes that firms utilize financial derivatives in risk management for the goal of maximizing firm value. Firms facing underinvestment with growth opportunities but scarce funds employ derivative to provide debt capacity. Managerial risk aversion is important as managers with stake in their firms utilize financial derivatives in managing corporate risk. Findings further reveal that Industry has a moderating effect on determinants of derivative use while Firm Size has no moderating effect on determinants of derivative use. The study contributes important evidence for Kenya on the usage of derivatives and risk management by publicly quoted firms and confirms extant theories on use financial derivatives. The important limitation of the study was the absence of organized derivative trading at the Nairobi Securities Exchange limiting the quality of data publicly available. The study's recommendations include; requirements for disclosures of firms' risk management techniques, investors' evaluation of growth opportunities versus available finance of firms in making investment decisions and allocation of ownership stakes to managers in public firms to motivate management to undertake effective risk management programmes.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Corporate management entails the management of risks using different set of tools. Traditionally tools of risk management included establishing branches abroad, leading and lagging and diversification were prevalent in the past. New tools were developed in the 1970s in the form of financial transaction known as derivatives. Derivatives are a significant component of the global economy, with notional market size exceeding \$700 trillion by 2001 (Bartram, Brown & Fehle, 2009). International Swaps Derivatives Association (ISDA) survey of 2009 reports, 94% of the world's 500 largest firms employ derivatives to manage financial risks, and 88% of the firms use derivatives to manage foreign exchange risk. By the end of June 2014, Bank of International Settlements (BIS) reports, the notional value of outstanding interest rates and foreign exchange derivatives held by global non-financial firms was \$15.7 trillion and \$9.1 trillion respectively.

Derivatives are financial contracts whose promised payoffs are derived from an underlying financial asset, instrument or an economic good (Stulz, 2004). The values of derivatives depend on the prices of traded assets (Hull, 2012). The principle working of derivatives is that they transfer risk from those who do not want to bear it to those who want to be exposed to the risk. The basic types of derivatives also called plain vanilla derivatives are forward contracts, futures, options and swaps (Elton & Gruber, 1995).

Forward contracts are the simplest form of derivatives involving an agreement to buy or sell an asset at a certain time in the future for a certain price (Hull, 2012). Forward contracts are traded in the Over-The-Counter (OTC) markets. The platform for trading in

forwards is provided by a financial institution. Future contracts are similar to forward contracts except that they are traded in organized exchanges. It is an agreement between two parties to buy or sell a specified asset at a certain time at a certain price where the exchanges guarantee that the contract will be honoured. Options are traded on both stock exchanges and OTC markets. A call option gives the holder the right to buy the underlying asset at a certain future date at a certain price while a put option gives the holder the right to sell the underlying asset at a certain future date at a certain price. Swaps are OTC agreements where entities exchange cashflows in a specified period in the future. The agreement states the dates when the cashflows are to be paid, the manner of payment calculated using future value on interest rates, an exchange rate or market variable (Hull, 2012).

Financial engineering has come with numerous variations of these derivatives. Derivatives can be transacted in private agreements on the OTC market or traded in organized exchanges. OTC markets are unregulated financial transactions where private entities enter into contracts. Organized exchanges provide a regulated environment where standardized financial products are traded.

Risk is an inherent component of business transactions, which leads to volatility of expected future earnings and cashflows. Businesses are exposed to risks from their operations and environment. Risk emanates from everyday transactions and interactions of business and introduces uncertainty into the receipt and magnitude of future expected cashflows. In everyday use risk is defined as possibility of loss while in rather technical use risk is the variability of the actual outcome from the expected outcome. There are three main forms of financial risk that a company is exposed to from external sources;

interest rate risk, foreign exchange risk and commodity prices risk (Froot, Scharfstein & Stein, 1994).

Interest rate risk results from the volatility of future interest rates therefore increases the fixed charge and debt liability of a company. Companies take on debt to undertake investments that are expected to produce returns. Interest paid is a fixed charge on the income of the firm which is paid along the principal some borrowed. Increase in interest rates leads to higher fixed charge payable by the company which may surpass the expected return from investments thereby introducing element of financial distress. The probability of changes of interest rates increasing suddenly is very real for Kenyan companies having experienced interest rate changes in the recent past. Base rates rose from as low as 11 percent to as high as 16.5 percent following the Central Bank of Kenya intervention in the markets in 2011.

Foreign exchange risk is the risk of fluctuation of one or more currencies that a company is exposed to, either increasing the cost of products or services or eroding the value of earnings. Companies that trade in the international markets are especially exposed to foreign exchange risk. Globalization and international trade have made this particular risk relevant. The foreign exchange risk affects earnings expected from operations in a foreign country in foreign currency where the earnings have to be repatriated to the home country. Kenyan companies in South Sudan are exposed to foreign exchange risk since the South Sudan pound has been falling against both the Kenya Shilling and the Dollar. Data from the Central Bank of Kenya shows that the exchange rate for the US dollar was 63.3 in 2007, 78.0 in 2008, 75.4 in 2009, 80.6 in 2010 and 80.6 in December 2011 (Otuori, 2013). This weakening of the Kenya Shilling over a period of six years exposes

firms to foreign exchange risk. In 2012 KenolKobil posted a loss of 6.28 billion Kenya shillings on account of foreign exchange hedge (Mugwe, 2013). KenolKobil hedged against the depreciation of the shilling forecasting a continued depreciation of the Kenya shilling to stabilize at around a hundred to the dollar.

Commodity Prices risk is the risk of fall or rise of the prices of commodities in the international market. Oil Companies, Tea Companies, Gold Mining and other metal dealers are specially exposed to foreign exchange risk. The risk of price changes of commodities affects producers, resellers and consumers differently and on any end of the spectrum one party is exposed to the risk of reduced or complete wiping out of future cashflows. In 2008, Kenya Airways lost 7.2 billion Kenya Shillings on a fuel hedge which caused much surprise to the players in the market (Miriri, 2009). The market was unaware of the firm's hedging practices using fuel hedge in the international market. Kenol-Kobil lost 6.28 Billion shillings in derivative based foreign exchange hedging in 2012 (Mugwe, 2013).

Risk management through hedging has been controversial among scholars since the widespread adoption of derivatives as hedging tools. The point of contention has been the motive for hedging against risk and the relevance of management actually engaging risk management activity. The usage of derivatives has also been related to the financial crisis. The development of sophisticated derivatives like Collateralized Debt Obligations, Collateralized Mortgage Obligations and Credit Default Swaps have been linked to the creation of complex and toxic assets that led to massive losses to their investors.

Financial theory is strained for explanations for corporate risk management. The relevance of risk management strategies have also been questioned by various theories of

financial management. Modigliani and Miller (1958) consider balance sheet activities of firms as irrelevant under perfect capital markets. Capital Asset Pricing Model (CAPM) contends that unsystematic risk is irrelevant, only systematic risk is relevant to investors who hold diversified portfolios (Sharpe, 1964; Lintner, 1965; Mossin, 1966). The assumption underlying the irrelevance theories is that of perfect markets where investors can engage in their own risk management activities including diversification. Perfect market assumptions are deemed unrealistic in the real world. Market imperfections can be used to explain why management engages in risk management. Finance theory suggests that under perfect market assumptions, hedging does not add to shareholder wealth. Theories of hedging show that relaxation of perfect market conditions leads to dissimilar conclusions about the significance of hedging (Judge, 2002). Stulz (1984) and Smith and Stulz (1985) suggest that hedging with derivative use has various positive impacts for the firm: reduce the volatility of cashflows, increase debt capacity of a firm and hence increase debt tax shield, reduce disruption cost of bankruptcy, reduce the probability that a firm will forego profitable investments, smoothing the firms stream of cashflows and may transfer tax obligation to the future.

Research investigating theoretical determinants of derivative use or cross sectional variations in derivative use has not been conclusive (Campello, Lin, Ma & Zhou, 2011). Generally, two perspectives attempt to explain corporate use of derivatives in risk management; value maximization or managerial utility (Heaney & Winata, 2005). Risk Management using derivatives can lead to maximization of firm value by affecting after net cash flows, cost of financial distress, underinvestment or reduce tax liability (Bartram, 2000). Research along the value maximization proposition has resulted in

mixed outcomes. Allayannis and Weston (2001) and Carter, Rogers and Simkins (2006) provide evidence of relationship between hedging with derivatives and value maximization. However, Guy and Kothari (2003), indicate that potential gains from derivative usage are economically insignificant. Tufano (1996), studying hedging characteristics of the gold mining industry, finds no support for firm value maximization as a determinant of derivative use. Jin and Jorion (2006), indicate that use of derivatives is actually associated with low value.

Evidence for managerial utility proposition is advanced by Tufano (1996) and Graham and Rogers (2002), who find that managers use derivatives where their personal wealth is tied up in the firm. Managerial utility is the interest of the management in the firm and points to the existence of agency conflicts. Accordingly managers tend to hedge their own positions where they hold significant shareholding or derive other benefits from the firm (Ameer, 2010).

The use financial derivatives as instruments of risk management have become popular with firms all over the world. Quoting various studies over the years Ahmed & Haris (2012) come up with disparate and all-encompassing statistics: 53.1% in New Zealand (Berkman, Bradbury & Magan, 1997), 61% of Fortune 500 S&P 500 firms in the United States (Howton & Perfect, 1998), 60% in the Netherlands (Bodnar, de Jong & Macrae, 2003), 59% in Sweden (Alkeböck, Hagelin, & Pramborg, 2006), 67% in U.K. (El-Masry, 2006), 78% in combined dataset of Hong Kong and Singapore (Sheedy, 2006), 61.6% in Denmark, Finland, Iceland, and Sweden (Brunzell, Hansson & Liljeblom, 2009) and 38% of all derivatives traded globally in the Asia Pacific. A survey by Correia, Holman

and Jahreskog (2012) in South Africa targeting large listed South African non-financial firms found that 90% of respondents used derivatives.

While there has been an explosion of derivative use in the developed world, sub-Saharan Africa has not experienced the emergence and growth of a derivative exchange except in South Africa. In Kenya OTC derivative contracts are transacted through local banks. Currency forwards deals are common among commercial banks on the overnight borrowing window. Currency options are not so common in the local markets (Oloo, 2011).

Recent studies in the Kenyan markets have focused on the challenges facing introduction of derivative instruments and reasons why Kenyan firms do not employ derivatives in risk management. According to Murungi, Murage and Wanjau (2014), the use of derivatives among Kenyan firms is low because of managerial skepticism, limited derivative microstructure and limited knowledge on derivative use and accounting. Chanzu and Gekara (2014) indicate that firms listed at the Nairobi Securities Exchange do not employ derivatives in their risk management strategies due to the general belief that exposures are well covered by other risk management tools.

Most of the local studies ignore that while there is no widespread application of financial derivatives in the local capital markets, a section of the firms listed in the security exchange use derivative instruments to hedge variety of risks. Ngugi, Njagi and Kimani (2013), report that firms listed at the Nairobi Securities Exchange use variety of derivative instruments to manage financial risks. This study explores the determinants of derivatives use among firms listed at the Nairobi Securities Exchange using theoretical determinants identified in literature.

1.2 Statement of the Problem

Past studies show that firms in various countries use financial derivatives for financial risk management but there is no agreement yet on the factors that determine use financial derivatives among firms. Finance theory holds that the rationale for use derivatives is to increase firm value by reduction of future tax liability, cost of financial distress, underinvestment costs and agency costs (Nance, Smith & and Smithson, 1993). However, empirical evidence has shown mixed results on firms' motives for hedging with financial derivatives. Some studies argue that use of financial derivatives maximize firm value by enhancing net cashflows (Allayannis & Weston, 2001; Carter, Rogers & Simkins, 2006). Research presents contrary arguments showing that management engage in hedging with derivatives to maximize their own utility (Jin & Jorion, 2006; Tufano, 1996).

Most of the studies on determinants of derivatives use have been conducted in developed markets indicating that theoretical determinants of derivative use have not been tested on emerging markets where the organized exchanges are underdeveloped. There is dearth of published reports on the determinants of derivatives use by firms in Africa. A survey of large listed South African non-financial firms by Correia, Holman and Jahreskog (2012) found that 90% of respondents used derivatives for hedging. Kenya is an important financial hub in Africa and establishment of futures market with exchange-traded derivatives is underway (CMA, 2013). Over-The-Counter derivative contracts with banks are fairly common in Kenya in specific sectors (Tanui, 2008).

Existing studies in this area on the Kenyan market have sidestepped the theoretical determinants of derivative use instead focusing mainly on factors influencing the

development of financial derivatives (Ngugi, Njagi & Kimani, 2013). Murungi, Murage and Wanjau (2014) report that the use of financial derivatives among firms listed on the Nairobi Securities Exchange is low because of managerial skepticism, limited derivative microstructure and limited knowledge on derivative use and accounting. Chanzu and Gekara (2014) indicate that firms listed at the Nairobi Securities Exchange do not employ derivatives in their risk management strategies due to the general belief that exposures are well covered by other risk management tools.

While there is no widespread application of financial derivatives in Kenya, a section of the firms listed in the security exchange use derivative instruments to hedge variety of risks. Ngugi, Njagi and Kimani (2013), report that firms listed at the Nairobi Securities Exchange use variety of derivative instruments to manage financial risks. The purpose of this study is to analyze the significant theoretical determinants of derivative use as applied to firms listed at the Nairobi Securities Exchange.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of this study is to analyze the determinants of derivatives use among firms listed in Nairobi Securities Exchange.

1.3.2 Specific Objectives

The research study pursued the following specific objectives:

1. To analyze the effect of debt on derivatives use among firms listed at the Nairobi Securities Exchange.

2. To investigate the effect of firm value on derivatives use among firms listed at the Nairobi Securities Exchange.
3. To examine the effect of underinvestment on derivatives use among firms listed at the Nairobi Securities Exchange.
4. To study the effect of managerial ownership on derivatives use among firms listed at the Nairobi Securities Exchange.
5. To explore the effect of tax incentive on derivatives use among firms listed at the Nairobi Securities Exchange.
6. To probe the moderating effect of firm size and industry type on the determinants of derivatives use among firms listed at the Nairobi Securities Exchange

1.4 Hypothesis of the Study

The hypothesis developed can only be generalized for firms listed at the Nairobi Securities Exchange. The following null hypotheses were developed for this study:

HO₁: Debt does not significantly affect use of derivatives among firms listed at the Nairobi Securities Exchange.

HO₂: Firm value does not significantly affect use of derivatives among firms listed at the Nairobi Securities Exchange

HO₃: Underinvestment does not significantly affect use of derivatives among firms listed at the Nairobi Securities Exchange

HO₄: Managerial ownership does not significantly affect use of derivatives among firms listed at the Nairobi Securities Exchange.

HO₅: Tax incentive does not significantly affect use of derivatives among firms listed at the Nairobi Securities Exchange.

HO₆: Firm Size and Industry type have no significant moderating effect on the determinants of derivatives use among firms listed at the Nairobi Securities Exchange.

1.5 Significance of the Study

One overriding goal of the firm is the maximization of shareholder value. Risk management entails that firms reduce the impact of various factors on their net cashflows. The application of effective risk management tools is significant in order to maximize shareholder value. A modern tool of risk management is the use of financial derivatives. In a perfect market world, risk management would be irrelevant. Finance theory indicates that use of financial derivatives increases firm value by ameliorating the effects of financial distress costs, underinvestment, tax liability and agency costs. Finance theory also indicates the size of the firm enhances the propensity to employ financial derivatives in hedging. Derivative use has also been associated with specific industries and sectors. In practice, however, the effects of financial derivative use have proved contentious with studies indicating that firms hedge when the managers' personal wealth are tied in the firm indicating that agency conflict is at play.

This study is timely as it comes at a time when the Nairobi Securities Exchange is planning to introduce organized trading in financial derivatives. The Nairobi Securities Exchange is currently putting together necessary policies and guidelines that will govern derivatives trading. This opens up the market to financial derivative instruments that

firms can use to hedge against risks. The findings of this study, conclusions and recommendations are essential for the different entities that are actively involved in the provision and use of derivatives instruments in the Kenyan markets.

This study is important to policymakers engaged in formulating trading framework for derivative instruments in the Kenyan Market. It is particularly useful to the Capital Market Authority and Nairobi Securities Exchange by clearly showing what determines derivative use among Kenyan firms. This research contributes to the current debate of establishing Kenya as an international financial hub and the introduction of derivative instruments at the Nairobi Securities Exchange. Firms employ derivatives mainly as means of risk management.

This study is also useful to shareholders and investors by analyzing a component of risk management of their firms they invest in. The rationale for using derivatives will only bear fruits if it actually has an effect on the specific parameters of the risk hedged. This research analyzes whether firm's decisions to use derivatives is determined by host of factors that important in financial risk management. Investors are interested in the reasons that compel managers to engage in financial risk management using derivatives and if that decision actually leads to enhancement in shareholder value. Two major firms listed at the Nairobi Securities Exchange, Kenya Airways and Kenol/Kobil reported huge losses resulting from use of derivatives for hedging in 2008 and 2012 respectively. This study attempts to show the determinants of derivatives for firms listed at the Nairobi Securities Exchange.

The study is significant to bankers, other regulatory authorities and finance scholars. Each of these parties is interested in the size of derivative market, the players, the main

derivative instruments employed and the determinants of use of derivatives. As a third world country embarking on introduction of new financial instruments, Kenya capital market authorities will find it significant any study that highlights on derivatives and their users.

1.6 Scope of the Study

The scope of a study refers to the boundaries or limits within which the study needs to be kept. The reasons for such limits may be geographical, historical, ideological, personal or any other declination imposed by the researcher or the environment. The scope of the study is a disclaimer that limits the generalizations of findings outside the set boundaries of the given scope. The scope in this study states the population, geographical location, the specific market and the years chosen for analysis.

The population of study is the firms listed at the Nairobi Securities Exchange in Kenya. The secondary data collected and analyzed covers five years from 2008 to 2012 and was used to achieve the objectives by testing the relevant hypothesis. A survey of firms listed at Nairobi Securities Exchange was conducted to provide primary data for demographical and background purposes. While the anticipated findings can be generalized for Kenyan firms and similar firms in Africa and the third world, the scope of research is limited to the population under study.

1.7 Limitations of the Study

A major limitation of this study is occasioned by the absence of active trading of derivatives in the organized exchange. Derivatives are not traded at the Nairobi Securities Exchange and are therefore not readily available to listed firms. This limits the ease of

obtaining data on derivative use among listed firms. There is no readily available public data on derivative use in all the technical sources and publications. To overcome this limitation a survey was conducted to obtain data relating to derivative use. Analysis of annual report disclosures was carried out to confirm whether firms employed derivatives for hedging. Information on derivative use was laboriously hand-collected over 5 year period.

The second limitation of the study is its limited Scope. The study only analyzes the firms listed at the Nairobi Securities Exchange for a period of five years. The study will not consider large private firms that are not listed at the Nairobi Securities Exchange. There are large privately held companies in the country whose financial information. Data collection, analysis and findings may be difficult to replicate for such important sector of the market.

The third limitation of the study is that it only analyzes the demand side of the determinants of derivative use and will not delve into the supply side of derivative use. Banks are the main suppliers of derivatives in the OTC markets and their motivation for derivative use is different from other firms. The financial industry has mixed motives for derivatives use; both for hedging and speculation. The study cannot therefore be replicated for banks and financial institutions although anecdotal evidence suggests that such firms engage in derivative use.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents the relevant literature of the study. The theoretical review outlines the theories behind risk management and the emergence of derivatives. The empirical review presents the most recent and ongoing research in this field and the current scholarly thinking. The chapter presents gaps in research that necessitates the present study and concludes with a summary of the chapter.

2.2 Theoretical Review

Corporate Risk management activities are aimed at reducing the volatility of returns and cashflows of the firm. However, scholarly work suggest that the real motivations of hedging activities can be viewed from three angles; capital structure, diversification and agency relationships. Capital structure angle considers the combination of debt and equity in a firm's balance sheet and determines if their proportions in the capital structure actually have an effect on the cashflows and returns of the firm.

Accordingly in a perfect market where information is symmetrical, capital structure is irrelevant to an investor. According Modigliani and Miller (1958), the way a firm is financed is independent of its value. Any value attributed to the proportions of debt and equity in the capital structure is offset through arbitrage. In a perfect market, value of the firm should is not be affected by the proportion of debt in its financial structure or by distribution of the profits as dividends or reinvestment back into the firm (Modigliani, 1980). However Modiglian and Miller (1963) and Miller (1977), take cognizance of this

fact and conclude that under certain conditions debt in the capital structure may actually lead to increased firm value. In the realm of risk management, activities that aimed at reducing firm's exposure are intended to address market imperfections like information asymmetry and existence of taxes (Stulz, 1984).

Diversification brings to the fore the concept of relevant risk. Accordingly there are two types of risk systematic risk and unsystematic risk. Risk is only relevant if it cannot be eliminated through diversification. According to portfolio theories proposed by Sharpe (1964), Linter (1965), Mossin (1966), in developed markets where tools of risk management are exchange traded investors will not attach premium to any hedging activities that management may employ. This brings in the idea that management should only focus on activities that shareholders cannot undertake by themselves.

According to agency theory which is covered in detail subsequently, management has a different motivation for its actions than shareholders as such risk management actions should be viewed from this angle. Studies in the usage of derivatives support this claim and indicate that where managers are highly invested in the firm, they are more likely to hedge (Tufano, 1996). There is apparent contradiction between corporate risk management practices which have become prominent over the years and the existing finance theories that view risk management practices by firms as redundant. Finance theory indicates that shareholders can engage in risk management and are better suited in undertaking hedging activities to reduce their individual exposures to risk (Allen & Santomero, 1998).

2.2.1 Agency Theory

According to proponents of this theory, Jensen and Meckling (1997), managers who are agents, make corporate decisions on behalf of owners who are principals of the firm. The agency problem arises when agents' interests are not aligned with principals' interests. Conflicts between managers and shareholders can arise on issues such as firm value, investment decisions and compensation contracts (Jensen & Smith, 1985).

There are several forms of agency problems in corporate management but two are significant in the case of risk management and hedging. The agency relationships between managers and shareholders dictate that shareholders dictate compensation system for managers in line with their objectives. Such compensation schemes may include shareholding and share options. Research has shown that managers who hold shares in the firms they manage are more likely to hedge than managers who don't (Tufano, 1996). Managers' wealth is affected by the total risk of the firm and this means that the managers will undertake risk management actions even through shareholders can diversify part of the risk. A manager who owns substantial interest in the firm is expected to hedge to protect to protect the personal holding against risks imposed on it by other claimholders (Smith & Stulz, 1985).

Another important agency relationship is the conflict between shareholders and bondholders. This agency relationship leads to underinvestment between bondholders who want investments in projects with positive NPV and shareholders who believe the benefits from new investments will accrue to bondholders (Mayers & Smith, 1987). Hedging with financial derivatives becomes necessary as part of the bond covenants in order to assure the bondholders of compliance.

Since managers can employ derivatives for their own interest, corporate governance measures come to play. Allayannis, Lel and Miller (2012) report that well governed firms with strong external country level or internal corporate governance measures receive premium from use of derivatives. Strong corporate governance therefore insures that the agency problem is controlled and managers engage in activities that enhance shareholder value. According to Borokhovich, Brunarski, Crutchley and Simkins (2004) firms with influential outside directors are more likely to use financial derivatives indicating that firms hedge were shareholders put mechanisms to handle agency relationships.

2.2.2 Risk Management Theories

In a Modigliani and Miller environment of perfect markets with no taxes, no contracting costs, no information asymmetry and no capital market imperfections, risk management using derivatives is irrelevant. Risk management would only be relevant to manage market imperfections and relaxing the MM assumptions. Firms engage in management of risk to protect their future cashflows against variations. This objective informs the hedging practices of any firm (Froot, Scharfstein & Stein, 1993).

Literature in this area is mainly divided into two competing theories attempting to explain the rationale for use of financial derivatives: firm value maximization which argues that firms engage in hedging in order to maximize shareholder value and managerial utility maximization which suggests that managers are risk averse and engage in risk management activities where their personal wealth or stake is tied in their firm.

2.2.2.1 Firm Value Maximization Theory

According to the theory of value maximization, management of financial risk maximizes firm value through; reduction of expected taxes, reduction of financial distress costs, mitigation of underinvestment problem and enabling a firm to increase its debt capacity and obtain debt tax-shield (Bessembinder, 1991). The overall objective is reduction of cashflow volatility and enhancement of present value of future cashflows hence maximization of shareholder wealth. Theoretically, using a proxy for firm value, firms that use derivatives should exhibit higher values than firms that do not.

Debt is a major incentive for hedging with financial derivatives. Corporate Debt involves constantly accruing financing costs that have to be periodically settled. Existence of this constant cash outflow subjects the firm to the risk of financial distress and Bankruptcy. Financially distressed firms face various costs including bankruptcy and reorganization costs. Hedging reduces the deadweight cost of financial distress (Ross, 1997).

According to Leland (1998), firms hedge to increase debt capacity which increases the firm's leverage leading to interest tax shield advantages. In an increasing debt environment equity holders lose value to bondholders but increased debt creates interest tax shield which more than offsets any value lost to bondholders. Firm value is enhanced by reduced tax obligations through debt tax shield.

Underinvestment problem is the conflict between equity holders and bondholders and was first analyzed by Myers (1977). This is an agency problem where equity holders may reject positive NPV projects because a significant amount of the cashflow from project will flow to the bondholders rather than equity holders. Bondholders understand these and they factor it into bond prices. If the firm has growth opportunities where external

financing is more expensive than internally generated funds, hedging with derivatives enhances the availability of internally generated funds for the existing investments (Froot, Scharfstein, & Stein, 1993).

Using financial derivatives for hedging risk is designed to reduce the expected tax obligations at the point where the marginal tax for the firm is convex. Reduced tax obligation retains cashflows within the firm and increases firm profitability. This leads to enhanced firm value (Smith & Stulz, 1985). Mayers and Smith (1987), Stulz (1996) and Graham and Smith (1999) theorize that tax convexity and reduced volatility of profits lead to reduced corporate tax liability for hedgers.

2.2.2.2 Managerial Utility Theory

Alternatively, In support of agency theory, Managerial Utility Theory suggests that managerial risk aversion may lead managers to use derivatives to management risk with the main objective of protecting their personal wealth tied in the firm with no regard to shareholder wealth maximization (Smith & Stulz, 1985). Risk averse managers will have higher propensity to hedge if their capital and wealth are tied up in the firm. The means that managers risk aversion is a motivating factor in risk management (Stulz, 1984). Managers that hold stock in their firms hedge more suggesting that Managerial risk aversion plays an important part in corporate risk management (Tufano, 1996).

Shareholders are not involved in risk management practices of the firm but set up compensation schemes that maximize owners' wealth by maximizing the value of the firm. Managers are involved in setting up the risk management practices of the firm and are interested as stated in the overall benefits that accrue to them over the firm life cycle

(Stulz, 1984). Agency theory suggests that Managers maximize their interest in the firm through consumption of perquisites. It can be deduced from this that managers also engage in various actions that reduce risk to their interest in the firm. Managers' utility can be maximized by engaging in risk management. Managers therefore tend to be risk averse when they own stock in the firm, hence maximizing managerial utility through risk management.

Proponents of this theory contend that available evidence does not support the maximization of shareholder wealth but supports the managerial utility function. Essentially, this body of work follows on the CAPM assumption that the only relevant risk is systematic risk. CAPM suggests that investors are perfectly capable of managing unsystematic risk through diversification. Investors do not place any premium on the firm's effort in managing unsystematic risk.

2.3 Conceptual Framework

A conceptual framework lays out the theoretical correlation between Independent variables, moderating variables and dependent variable (Kothari, 2011). Figure 2.1 presents the conceptual framework for the study. The dependent variable is Derivative Use which is a binary, dichotomous measure which was coded "1" for derivative users and "0" for non-users. This is a fairly common method used in empirical literature and informs the methodological approach of the study (Ahmed & Haris 2012, Sprcic 2007, Géczy, Minton & Schrand 1997, Allayannis & Weston 2007, Smith & Smithson 1993).

The independent variables are theoretical determinants of the use of financial derivatives. From the objectives and hypothesis developed through analysis of relevant literature, five

independent variables were selected to test the determinants of the use of financial derivatives, Debt, Firm Value, Underinvestment, Managerial Utility and Tax Incentive.

Debt is an important driver of financial risk that firms seek. Financial distress, cost of financing and leverage are applied as proxies for debt.

Firm Value is measured by Market to Book Value, Tobin Q, Book Value of Sales.

Underinvestment is represented by Investment Expenditure, Dividend Payout Ratio and Debt Ratio. Managerial Utility is proxied by Directors Remuneration and Management Shareholding. Tax Incentive is measure by a dummy variable indicating the presence of Deferred Tax.

Two moderating variables have been identified from close examination of extant literature; firm size and industry type. Firm size is measured by market capitalization while industry type is categorized as manufacturing and non-manufacturing sectors.

Independent Variables (IV)

Moderator Variable

Dependent Variable (DV)

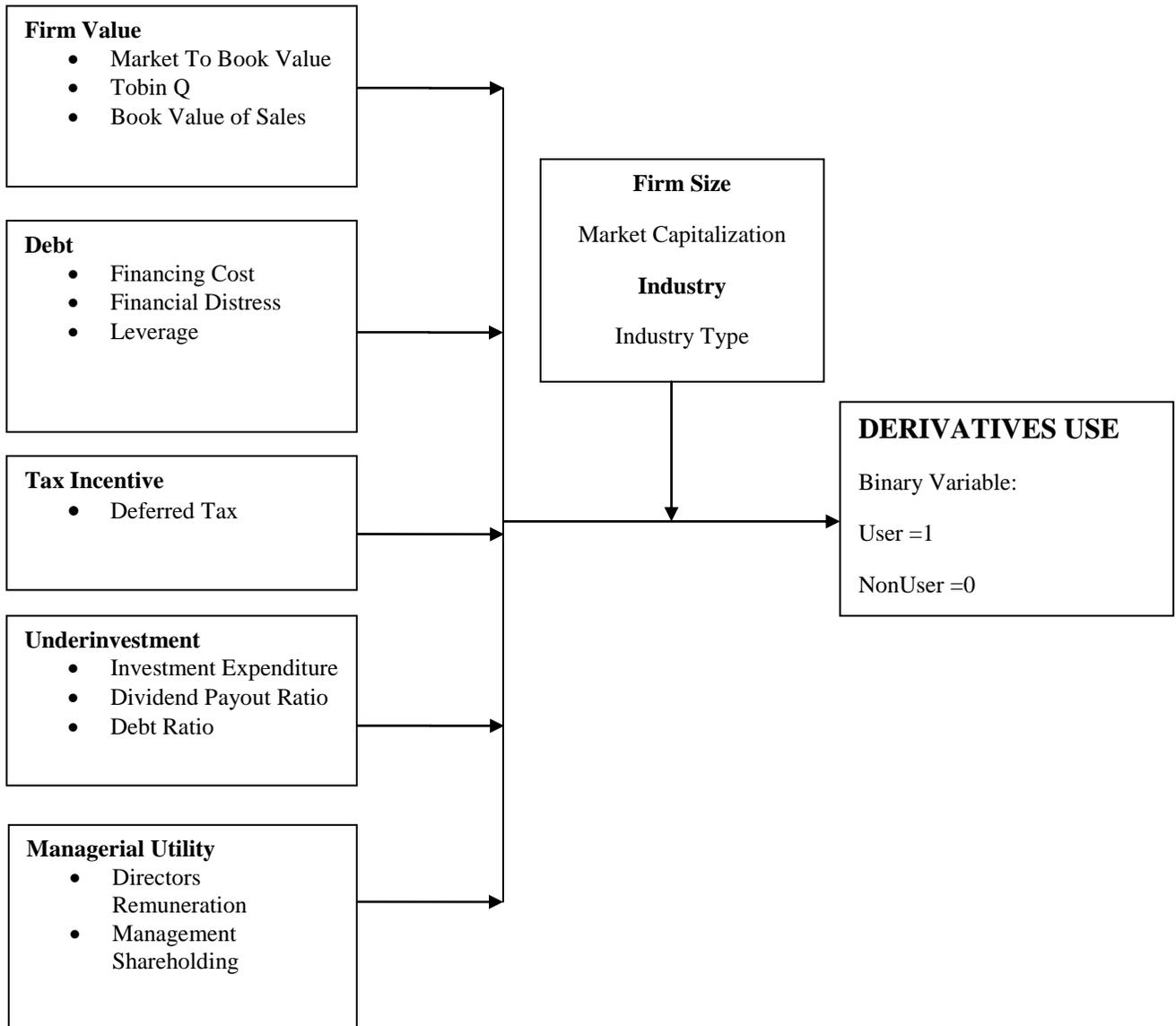


Figure 2.1: Conceptual Framework

2.4 Empirical Review

Derivative use is a dichotomous binary measure where a firm is either a derivative user or is not (Sprcic, 2007). Empirical literature has examined firm's propensity to hedge with derivatives from different perspectives. Few studies have directly measured the impact of the use of derivatives on firm value. Allayannis & Weston (2001) applied *Tobin Q* as proxy for firm value and concluded that there is a positive relation between firm value maximization and foreign exchange derivative use.

Guay and Kothari (2003) analyzed 234 large non-financial corporations measuring firm value using cash flows and conclude that economic importance of derivative use is overstated and empirical research in this area should be rethought. Jin and Jorion (2006), uses *Tobin Q* to proxy firm value for Gold Mining Industry and conclude that they cannot find positive relation between firm value and hedging activity of the firm. Mackay & Moeller (2007) studies oil refining firms measuring firm value using by *Tobin Q* and conclude that derivative use does affect firm value.

However many studies measure firm value indirectly by studying the various factors that contribute to firm value. Geczy, Minton, and Schrand (1997) study the use of currency derivatives by 372 fortune 500 companies in order to differentiate the theories of hedging behaviour and find that underinvestment and the need to manage cashflow variations are the motives behind derivatives use.

Haushalter (2000) studies the oil and gas companies risk management policy and conclude that financing cost is a primary factor in the use of derivatives and hence supporting the value maximization theory. The study also finds that hedging is more pronounced where the prices of commodities are closely related to the prices of

derivatives at the stock exchange. Graham and Rogers (2002) study if firms hedge in response to tax incentive and find no evidence firms engage in hedging for reasons of tax incentive. They however found that increasing debt capacity enhance tax savings through interest tax shield which helps accrue tax savings to firms. The conclusion of the study supports the value maximization theory.

A number of empirical studies have examined whether derivatives are used for speculative purposes alongside risk management by non-financial firms. Geczy, Minton, and Schrand (2007) argue that firms are on average using derivatives for hedging not speculation. Chernenko and Faulkender (2011) used large panel data to examine the two sides to usage of derivatives; hedging and speculation. They conclude that there equal motivations for hedging and speculation in the usage of derivatives.

Guay (1999) examined the role of derivative instruments in a sample of firms using derivatives for the first time and concludes that the primary motives for derivative use is hedging rather than increasing shareholder risk. Adam and Fernando (2006) argue that, for a sample of 92 North American Gold Mining firms, there is consistent positive cashflow from derivative positions. The study concludes that use of derivatives can lead to increase in shareholder value through generation of premium.

Other researchers have focused on whether the use of derivatives impacts on firms' common risk factors such as Firm Value, Debt, Tax, Underinvestment and Managerial Ownership. The presence of debt, tax incentive, underinvestment and managerial ownership in the firm are considered as motivations for use of derivative use (Nguyen & Faff, 2002). Donohoe (2012a) looks into the benefits of tax avoidance as determinants of derivative use. Allayannis and Ofek (2001) test the theory of hedging related to

underinvestment using R&D expenditures as proxy. Bartram, Brown and Fehle (2009) in a wide ranging comparative study of over 7000 firms in 50 countries using financial distress cost and financing cost as proxies for debt, concludes that derivative use is not overtly motivated by shareholder value maximization. Zhang (2009) argues that interest rates on debt motivate firms to employ hedging with derivatives as risk management tool. Firm size and Industry affect the firm's decision to hedge. Firm size is a moderating variable that either increases the propensity to hedge or not to hedge with derivatives. The industry in which a firm operates also affects the propensity to use derivatives. Extractive industries like oil and gas are more likely to hedge than other industry. Firms in international trade are more likely to be exposed to foreign exchange risk as well as international markets where derivative instruments are traded.

Following theory, empirical research has concentrated mainly on two rationales for hedging with derivative for purpose of risk management; either hedging is employed to increase the value of the firm or to enhance managers' utility function For hedging to increase firm value it should reduce the volatility of cashflows by reduction of tax payable, reducing costs of financing and financial distress, reduction of agency costs and reduction of the underinvestment problem (Stulz, 1984).

From the above contextual analysis, the theoretical determinants for use of derivatives in are summarized as firm value, debt, underinvestment, managerial ownership and tax incentive (Nguyen & Faff, 2002). For the rest of this section, the empirical review critically examines in detail the various studies investigating the theoretical determinants of the use of financial derivatives.

2.4.1 Derivative usage

According to Triki (2005), testing of corporate hedging theories using financial derivatives presented three main challenges to researchers; identification of hedgers in the population considered, measurement of corporate hedging and identification of determinants of derivative use.

Identification of firms that use derivatives posed challenge to researchers over the years. Triki (2005), identifies three possible approaches used by researchers over the years: use of survey results, use of keyword search of databases and use of private information. The use of survey was the first research design applied by scholars in the field in the US beginning 1986. Block and Galagher (1986) were among the first to identify hedgers using a survey of firms in the US. Other researchers followed with the survey being sharpened and applied across industries and countries. The famous Wharton Survey became a standard approach by researchers to gauge the level of derivative usage in various countries (Bodnar, Hayt, Martston & Smithson, 1995). Surveys were carried out in various countries over the years in order to gauge derivative use. In New Zealand, Berkman, Bradbury and Magan (1997), carried out a survey of 79 firms and concluded that New Zealand firms were more extensive users of derivatives relative to their size and have more extensive reporting systems but have the same motivations for derivative use as firms in the US. In Netherlands, Bodnar, de Jong and Macrae (2003), carried out a comparative study between US and Dutch firms and concluded that institutional differences between the US and the Netherland have significant effects on risk management practices and affect the use of derivatives among firms. Such institutional

differences include; shareholder orientation, international trade, disclosure regulation, and the reliance on financial markets. In Sweden, Alkebäck, Hagelin, and Pramborg (2006), carried out a comparative survey research on derivative use among Swedish firms for 1996 and 2003 and found that there is little increase in derivative use among Swedish firms. They also found that Swedish firms were highly concerned with lack of knowledge of derivatives among firms. In the U.K., a survey by El-Masry (2006), found that larger firms, publicly quoted firms and international firms are more likely to use derivatives than small firms, private firms and local firms. The survey also found that UK firms use derivatives for management of cashflows. In Hong Kong and Singapore, Sheedy (2006) survey concluded that derivatives are more popular in Hong Kong and Singapore than in the US. The survey also found that derivatives were popular for speculative purpose than in the US and market timing played as an important determinant of hedge trades. Survey in Denmark, Finland, Iceland, and Sweden by Brunzell, Hansson and Liljebloom (2009) indicate that the hedging dominates the motive for derivative use but to a lesser extent speculation it need for additional income plays a role. The survey also found that financial firms use derivatives more for profit than for hedging. Surveys were however shown to suffer from non-responsive bias with hedgers having more incentive to respond than non-hedgers. Surveys also introduce noise into the analysis through sampling bias. According to Haushalter (2000) respondent firms had higher asset values than non-respondent firms. Surveys also had varied approaches and little comparability of various studies.

The second approach in identifying hedgers is the use of keyword search of databases and use of databases of derivative users. This approach was developed once data especially

company annual reports was available in databases of governments and regulatory authorities. Many important studies were based on this approach of using annual reports analysis as a basis of data for the study. Howton and Perfect (1998), carried out study of use of currency and interest rates derivatives by use firms through analysis of annual reports of 451 firms. The study concluded that swaps were the most used types of interest rate derivatives and futures are the most popular currency derivatives. Nguyen and Faff (2003) used annual report analysis to study the evidence of corporate derivative use in Australia. The study indicated that value maximization is the dominant motive for derivative use among Australian Firms. Geczy Minton and Schrand (1997) used annual reports analysis to study why firms use currency derivatives using a sample of 372 of the Fortune 500 nonfinancial firms in 1990. The study concluded that, Firms with greater growth opportunities and tighter financial constraints are more likely to use currency derivatives.

The initial difficulty with the use of databases was that derivative usage is an off-balance sheet transaction and firms were at liberty to disclose their use of derivatives. The information obtained therefore was based on voluntary disclosure which risked identifying hedgers as non-hedgers on the basis of non-disclosure. The quality of information has improved over the years. Standards of reporting have adopted a mandatory disclosure of risk management techniques. Companies must now disclose not only the risks they manage but financial instruments they use and the magnitude of their disclosure according to IFRS 39 and IFRS 7. Correia, Holman and Jahreskog (2012) analyzed the annual reports of the 100 largest South African companies and concluded that over 90% of the firms used derivatives.

In some cases identification of hedgers was based on specialist private information. Many of the studies carried on Gold mining firms in North America were based on private data provided by Ted Reeve (Triki, 2005). Gold mining being a specific industry with peculiar characteristics provided researchers with away to provide industry differences in the characteristics of derivative usage. Tufano (1996) studied risk management practices of US Gold Mining industry employing private specialists' survey data compiled by Ted Reeve, a Canadian equity analyst specializing in precious metals. Dionne and Garand (2003) updated Tufano (1996) data and recalculated the determinants of derivative usage for non-financial firms specifically US Gold Mining Industry. Brown, Crab and Haushalter (2003) also apply Ted Reeves data to 44 Gold Mining firms in the use and support their analysis with surveys on similar firms.

The preferred approach to identification of hedgers in most recent empirical research on the theoretical determinants of derivative use is a combination of Wharton style experience survey and analysis of annual reports (Sprcic, (2007)). This approach is adopted in the present study.

2.4.2 Firm Value

Finance theory assumes that the central objective of risk management to increase firm value and in effect increase shareholder value. Employing derivatives in risk management should therefore support this theory. If hedging with derivatives directly it affects various variables that affect firm's profitability and cashflows. This can be achieved either by increasing total asset value, increasing the market value or enhancing the total sales. Various studies used different proxies to measure firm value. There are four main proxies

evident in relevant studies; Tobin Q, Market to Book Value, Book Value of Assets and Book Value of Sales. Bartram, Brown and Conrad (2011), carried out an extensive research using a large sample of 6888 non-financial firms in 47 countries. Their study applied multivariate analysis matching derivative users against non-derivative users and adjusting for bias. Using Tobin Q as measurement of firm value, they concluded that hedging reduces both total risk and systematic risk. This is a marked deviation from the bulk of literature that shows either minimal benefit to the firm or no value enhancement in derivative usage.

Naito and Laux (2011) studied 434 non-financial firms using Tobin Q to represent firm value and conclude that there are no statistically significant results demonstrating that derivative use enhances firm value. The study employed the notional value of derivatives disclosed in financial statements to identify hedgers from non-hedgers. Notional values of derivatives represent the total amount of derivatives at any particular time theoretically. Practically however firms with short and long position in a particular instrument may report zero notional value, since the two positions net off.

Allayannis and Weston (2001) studies 720 large US non-financial firms between 1990 and 1995 find a positive relation between firm value and use of foreign exchange derivatives. Using Tobin Q ratio as proxy for firm value, the researchers find that firms that use foreign exchange derivatives for hedging have 4.87% premium over firms that do not. This is economically and statistically significant. Pramborg (2004), studies a sample of Swedish firms exposed to foreign exchange exposure and concludes that hedging transaction risk enhances firm value while hedging translation risk does not. This is an interesting observation and has implications on risk management decisions. A study in

UK by Clark and Judge (2009), conducted on sample 412 non-financial large companies, concludes that hedging foreign exchange exposure is value adding.

Accordingly, the impact of hedging with derivatives on firm value can be regarded as industry specific. Carter, Roger and Simkins (2006), in a study of 28 Airline companies finds that hedging of jet fuel prices leads to higher firm value by a hedging premium of five to ten percent. While several studies have been conducted on gold and silver mining companies, one study by Adam and Fernando (2006), concludes that hedging with derivatives leads to increased cashflows.

Guay and Kothari (2003) demonstrate that the relationship between firm value and hedging is spurious and makes no economic sense. The gains postulated in hedging are too minute for large companies. In summary, empirical evidence however is inconclusive on the ability of management to engage in derivatives usage to enhance firm's value. Similar studies by Jin and Jorion (2007) using Tobin Q as proxy for firm's value for 44 North American Gold Mining firms from 1991 to 2000, could not find any positive relationship between hedging activities and firm value. Jin and Jorion (2007) conclude that since commodity price exposure is transparent and available to all investors, it is not rational to expect that hedging against commodity prices should lead to higher firm value. Firm value is in many cases treated as an endogenous variable and is not considered as a determinant of derivative use. Since firm value can be directly measured by several variables chief of which is the Tobin Q ratio, it is rational to include it as a determinant of derivative use (Tufano, 1996). Including firm value as a determinant will take care of incremental values which on their own may appear statistically insignificant but may become significant once they add up.

2.4.3 Debt

The presence of debt in the capital structure is a possible reason why companies employ derivatives for hedging. The cost of debt is interest which can be costly depending on the economic conditions prevailing. The extent of hedging is related to financing costs and financial distress costs; companies with higher level of leverage are more likely to use derivative to hedge than firms with lower level of debt (Haushalter, 2000). Firms that face fixed charge on their earnings are prone to financial distress and bankruptcy. The cost of financing and financial distress is a risk to the going concern assumption in the firm. There are two categories of financial distress costs; direct and indirect costs. Direct costs are all explicit costs of bankruptcy administration including legal fees and management costs paid for the bankruptcy procedures. Indirect costs are of implicit losses due to likelihood of financial distress, such as loss of business and market share (Judge, 2002). Mayers and Smith (1982) argue that firms undertake risk management activities in order to avoid the cost of financial distress which may lead to bankruptcy or enhance the cost of bankruptcy. The study focuses on insurance as a classical risk management tool and concludes that risk management activities lower the cost of financial distress. Smith and Stulz (1985) find that hedging with financial derivatives may lower the deadweight cost of financial distress. Financial distress is related to debt. Higher total debt to total equity ratio leads to higher chances of facing financial distress. Companies with high level of debt are more likely to hedge than companies with a lower level of debt. Dolde (1995) argues that firms' usage of derivatives for hedging is intrinsically related to leverage which affects both the costs of financial distress and agency. Guay (1999) finds that new derivative users employ derivative instruments for

hedging various firm level risks including the risks associated with financial distress and bankruptcy. Graham and Rogers (2002) study a sample of 442 firms, applying multivariate analysis to notional values of derivatives and leverage ratio as measure of debt and conclude that firms hedge because of expected costs of financial distress. Purnanandam (2008) studies a sample 2,256 firms and concludes that firms facing financial distress hedge more. The study shows that there is a positive relationship between leverage and hedging for moderately leveraged firms.

Financing costs is affected by the microeconomic conditions that lead to fluctuations of interest rates. Floating interest rates will disadvantage a firm if the interest rates rise. Fixed interest rate regimes disadvantage a borrower if the interest rates fall. Firms hedge their exposure to maintain a predictable level of interest payments over the life of debt finance. Hedging allows firms to improve their contract terms lenders and obtain lower interest rates. According to Campello, Lin, Ma and Zou (2011), using extensive hand collected including loan covenants and agreements, matched with firm's size and profitability, hedging reduces the cost of financing and eases the investment process. Accordingly, hedgers significantly differ from non-hedgers with respect to loan characteristics and investment spending.

Past literature grappled with appropriate proxies for modeling debt in the capital structure. The presence of debt in the capital structure is measured by proxies representing financial distress and cost of financing. Financial distress is closely related to leverage, the higher the leverage the higher the probability of financial distress. The popular proxy for leverage is the ratio of book value of long-term debt to book value of assets (Géczy, Minton & Schrand, 1997). Operational costs play an important role in

exacerbating financial distress costs; firms with high operating costs are likely to face financial distress than firms with low operating costs. Tufano (1996), and Haushalter (2000), employ operational costs as proxy for Financial Distress. Changes in the ratios included in the Altman Z-score are considered as excellent proxy that captures the possibility of a firm facing financial distress (Brown, Crab & Haushalter, 2003). Altman Z-score ordinary should have negative relationship with loan spreads since firms with lower Z-scores should be charged higher rates of interests. However, research has indicated that Altman Z-score shows positive and significant coefficient as a measure of financial distress (Campello, Lin, Ma & Zou, (2011).

The parameter used in research as proxy for cost of financing is the interest cover ratio (Sprcic, 2007). The rationale is that firms with low interest cover ratio are prone to high interest payments and therefore high cost of financing. Interest cover ratio can also be used to model the possibility of financial distress. Low interest cover ratio means that the firm will face difficulties in settling its fixed obligation and therefore prone to financial distress (Gay & Nam, 1998). To capture the effects of all the proxies, the study applies multiply the proxies and uses the resulting product for analyses. Such a proxy will be superior to others because it contains an aspect of each measure of financial distress. To capture overall debt, leverage ratio is used to include the effects of cost of finance, the interest cover ratio is used and to capture the propensity to suffer bankruptcy, Altman Z-score is applied.

2.4.4 Tax Incentive

Tax incentive and management is an important aspect of corporate financial management. Firms engage in tax avoidance schemes in order to reduce their tax liability. Smith and Stulz (1985), hypothesized that firms engage in hedging in order to reduce their tax liability and the tax structure under which a firm operate will affect the decision to hedge. Firms operating in convex tax structures have incentive to hedge so long the cost of hedging remains lower than its benefits. Companies facing progressive tax regimes and those operating in limited loss carrying environment engage in hedging to enhance large losses or increase the length of period they can carry the loss forward. Reduced taxes may temporarily improve their accounting results through tax savings. This is viewed by investors as a value increasing activity. Hedging for purposes of tax benefits is considered as part of tax planning program of the firm. Derivatives when combined with creative ownership structures reduce taxes by generating non-economic losses and offer alternative tax treatments of similar transactions (Donohoe, 2012a). Derivatives enhance debt capacity of the firm; hedging and leverage have a positive relationship. Haushalter (2000), studying the hedging characteristics of Oil and Gas producers, argues that firms facing a lower marginal tax rate hedge less extensively than firms facing higher marginal tax rate. Graham and Rogers (2002), find no evidence to suggest that firms use derivative in response to tax convexity. Alternatively firms use derivative to enhance debt capacity and higher debt level creates greater interest tax shield. Deductibility of interest as expense before tax is a primary motivator of use of debt by firms for financing. Graham and Rogers (2002) study the hypothesis that firms hedge in response to tax incentives using a sample of 442 firms and estimate that the benefits accrued from

hedging to increase debt capacity as approximately 1.1% of firm value. This supports the contention advanced in Myers (1984) that enhanced debt capacity leads to a higher debt tax-shield. According to Myers (1993), capital structure relevance increases as debt capacity increases and more benefits accrue from higher debt-tax shield. Warner (2008) reports that American Banks show a common practice of using derivatives for tax avoidance schemes and were accused by Congress of cooking up over 100 Billion dollars derivative tax dodging in 2008.

Graham and Smith (1998) conclude, “for corporations facing tax-function convexity, hedging lowers expected tax liabilities, thereby providing an incentive to hedge”. Graham and Smith (1998) analyze 80,000 COMPUSTAT firm-year observations and find corporations face convex effective tax functions and thus have tax-based incentives to hedge in 50 percent of the cases. Accordingly, Nance, Smith and Smithson (1993), find that firms operating under convex tax regime are more likely to hedge than other firms. Convexity of tax regimes is corporate graduated tax rates in where the rates of taxes rise as the net income of the firm rises. Smith and Stulz (1985), suggest that tax convexity is caused by the progressivity of tax regimes, tax loss carry forwards and tax incentives like investment tax credits. The benefits of taxation are greater when the firm taxable income is in the progress zone of the tax code and when the firm enjoys tax incentives like tax loss carry forwards, investment tax credits and foreign tax credits (Judge, 2002).

According to Ross (1997), argues that leverage in the capital structure will lead to rise in the value of firms due to the interest tax shield accruing to the firm. Leland (1998) concludes that hedging firms can increase debt capacity which leads to higher interest tax shield and hence enhance firm value. Mian (1996), studies hedging activities across a

sample of 3022 US firms and concludes that progressivity in the tax structure applies to a very narrow range of pretax income. Wysocki (1996) agrees that progressivity in tax code applies over a small range of taxable income but intimates that generous provisions for tax loss carry forwards and investment tax credits buttress convexities over a larger range of taxable income.

Donohoe (2012b) finds that tax incentive is both a determinant and outcome of derivative use. The study shows that using derivatives a company can reduce its current taxes and cash paid by 1.7 and 4.0 percent respectively. This is not explained by risk management approach of the firm but the aggressive tax avoidance nature of such firms. Aggressive tax planning initiatives of tax avoiding firms determine derivative contracts initiation. The use of derivatives reduces taxes through generating noneconomic losses and providing alternative tax treatment of identical financial positions (Donohoe, 2012a).

The motive for employing derivative for purpose of tax reduction by Kenya firms is not strong because Kenya's tax regime lacks progressivity. In Kenya firms pay flat rate of tax on their net income, however firms enjoy tax loss carry forwards and investment tax allowances depending on the type of investments undertaken. Judge (2002), observes the same condition prevailing in the UK where the tax is progressive between 0 and 1.5 million pounds and thereafter assumes a flat tax rate. In Kenya where a company makes a loss, it may carry the loss forward over a period of four years to offset against future profits. Capital allowances are offset against taxable profit to reduce tax liability. The link between the level capital allowances and tax incentive to hedge can be made through financing of projects through debt capital, which leads two indirect benefits; interest-tax shield and investment capital allowances.

To capture tax incentive to hedge various proxies have been applied in research. The most common proxy used to model tax as determinant of hedging is the amount of tax loss carry forwards or a dummy variable representing the presence of tax loss carry forwards in the balance sheet (Triki, 2005). Since Kenyan firms do not face progressive tax regimes conventional variables for modeling tax incentive to hedge may not apply. Moreover, tax loss carried forward can only be observed where the company was experiencing losses in the past. To measure the presence of tax motive as determinant for hedging the study applies a dummy variable that is censored at 1 if a firm reports deferred tax and zero if the firm does not.

2.4.5 Underinvestment

According to various studies hedging is aimed at reducing underinvestment problem. Underinvestment is the firm's inability to undertake existing profitable investment opportunities due to lack of internal and external funds. According to Froot, Scharfstein and Stein (1994), risk management paradigms rest on three assumptions; the key to achieving corporate value is making good investments, good investments require enough internal cashflow to be generated, cashflow is subject to volatility in external factors like exchange rates, commodity price and interest rates which potentially sabotage firm's ability to make good investments. As such, Froot, Scharfstein and Stein (1994), state that the overarching goal of risk management program is to ensure the firm has enough cash to make value-increasing investments. Companies would rather use their internal funds to fund existing opportunities. When has profitable investments and is facing high cost of debt, the firm would rather hedge its own cashflows saving itself the need to take up a

costly debt. Gay and Nam (1998) study the underinvestment problem using a sample of 325 users and 161 non-users of derivatives and applying Tobit model and conclude that firms use derivatives to avoid underinvestment problems and as eventual strategy to increase shareholder value. Froot, Scharfstein and Stein (1993), argue that where external source of funds are costly to a firm than internal sources, there is rationale for hedging. Firms hedge to bolster their ability to generate less costly internal funds for positive NPV projects.

According to Gay and Nam (1998);

An underinvestment problem results when firms find that external financing is sufficiently expensive that they must reduce investment spending during times when internally generated cash flows are not sufficient to finance growth opportunities (Gay & Nam, 1998, p. 53)

Where underinvestment exists, shareholders forego positive net present value projects because they will benefit bondholders (Myers, 1977). Costly external financial is a market imperfection that forces companies to adopt hedging strategy hence enabling them to exploit existing growth opportunities. For underinvestment problem to arise, a firm must have access to projects with positive Net Present Value and must low cash reserves to finance them. Campello, Lin, Ma and Zhou (2011), intimate that hedging firms pay lower interest spreads and are less likely to have capital expenditure restrictions in loan agreements. These favorable financing terms, in turn, allow hedgers to invest more by alleviating the problem of underinvestment. Bessembinder (1991) finds that derivative use can alleviate underinvestment problem by shifting individual future states from default to non-default outcomes and thereby increasing the future states in which

shareholders can become residual claimants. Where the equity holders are residual claimants there incentive for the firm to invest in projects with positive net present value is enhanced.

According to Ahmed and Haris (2012) that non-financial firms use hedging to avoid underinvestment problem rather than to avoid financial distress. The research was conducted in Malaysian on Malaysian non-financial firms that are in an emerging market economy. Ahmed and Haris (2012) is the closest benchmark to the Nairobi Securities exchange. However, Chiorean, Donohoe and Sougiannis (2012), believe that they have brought to an end the debate on firm's engaging in derivatives usage to alleviate the underinvestment problem. According to this latest research, "firms neither implement derivatives to reduce underinvestment nor alter their investment behavior after beginning to use derivatives" (Chiorean, Donohoe and Sougiannis, 2012, p.1). This brings new angle to a major component of the firm value enhancing theories of hedging. However, research suggests that motives and benefits from hedging are subject to environmental and firm characteristics (Ammon, 1998).

Growth opportunities are related to growth of assets and investments. The ratio of Market Capitalization and Book value of equity is a good predictor of investment opportunities (Ahmed & Haris 2012). However market value of equity is affected by many factors including demand and supply of the shares in the market. A better measure of growth opportunities is the ratio of investment expenditures to book value of assets (Sprcic, 2007). Haushalter (2000) uses Investment Expenditure are a proxy for underinvestment since underinvestment is related to the firm's ability to undertake positive NPV projects in any given year. Géczy, Minton and Schrand (1997), prefer R&D expenditures for any

given year as proxy for underinvestment. The argument for R&D expenditure stems from the fact that firms face underinvestment on new projects rather than continuing projects covered by existing budgets. Aretz and Bartram (2010), intimates that Market to Book Value ratio hypothesis has been generally rejected and suggest that Debt ratio multiplied with either the market-to-book ratio or R&D expenditures may be a better proxy for underinvestment problem. Chiorean, Donohoe and Sougiannis (2012), suggest combination of proxies to represent underinvestment and growth opportunities: R&D expense per dollar of total assets; Tobin's Q; market-to-book ratio; price-to-earnings ratio and firm-level investment opportunity set. This demonstrates the inherent problem with coming up a single proxy to model the intended variable.

For the purpose of this study, debt ratio is used to represent the effect of costly external financing. Underinvestment is experienced where the firm faces costly external financing where bondholders factor in their conflict with the equity holders into the price of bonds. To factor in the presence of growth opportunities, the increase in capital expenditure is used as a proxy. Capital expenditure represents continued investments into the company's operations. A further proxy, divided payout ratio is introduced to indicate the hypothesis that firms with high growth opportunities pay lower dividends than firms with no growth opportunities.

2.4.6 Managerial Ownership

Risk management theory indicates that managers are inherently risked averse. Usage of derivatives is related with managing risk and minimizing the firm's cashflow volatility. Risk averse managers engage tend to engage in hedging because their wealth and human

capital are tied up in the firms they manage. The cost of managing risk on their own is more expensive than hedging the activities of the firm (Stulz, 1984). Smith and Stulz (1985) argue that since it is the shareholders who choose the managerial package, they bond the management to hedging policy; a firm therefore will hedge so long as the compensation package set by shareholders for management is implemented. The empirical implication of this is that a manager who significant portion of a company is likely to hedge more. Empirical research indicates that managers will engage in hedging using derivatives if their own personal wealth and interest are at stake and engaging in personal hedging activity outside the firm is impossible. Tufano (1996), studies the risk management practices of American Gold mining industry and concludes that managers who have their own stake in the firm are more likely to hedge than managers who have no stake in the firm. To represent the managers' interest in the firm, Tufano (1996), used percentage of managers' shareholding, outstanding options held by officers of the firm and presence of large blockholders in the firm ownership. Tufano (1996) states that "little empirical support for the predictive power of theories that view risk management as a means to maximize shareholder value" (Tufano, 1996, p. 1097-1137). However Tufano (1996) finds support for management utility function theory suggesting managers who hold more options did not engage in hedging while firms whose managers hold more stock actively hedged their position. This suggests that managerial risk aversion informs firm's risk management programs. Graham and Rogers (2002) also reach a similar conclusion that managers' equity holdings affect their inclination to hedge.

Lel (2006) connects derivative use the strength of corporate governance in the firm. Accordingly firms with weak governance use derivatives for managerial self-interest and

selective hedging. Leland (1998) argues that hedging is related to agency costs which put obstacles on leverage and debt maturity. The study argues that hedging benefits the firm when the value of the agency costs is relatively low. Fok, Carrol and Chiou (1997) find that hedging reduces agency costs as the ownership structure of the firm makes affects desirability of hedging. Borokhovich, Brunarski, Crutchley and Simkins (2004) argue that where outside directors are of high quality, derivative use in the firm is employed in the best interest of the shareholders. This enhances the argument that use of derivatives is dependent on the strength of corporate governance in the firm. Agency theory plays a part in the managerial risk aversion where managers whose personal wealth is tied with the performance of the firm are more likely to hedge risks than managers who have lower stake in the firm. Alternatively Mian (1996) finds no evidence to support that managerial ownership has any effect on derivative use. Wysocki (1996) suggests that derivative use decreases with insider ownership and is not influenced by the size of the CEOs wealth held in equity of the firm.

2.4.7 Firm Size

The size of the firm is important in determining economy of scale. Major previous studies find a positive relationship between firm size and the likelihood a firm will hedge. Judge (2002), studies 400 UK firms using logistic regression and concludes that large firms are more likely to employ derivatives. Nance, Smith and Smithson (1993) study 104 firms in the COMPUSAT database and conclude that firms which hedge are larger than firms that do not hedge. Size therefore is an important factor in the decision to hedge risks. Mian (1996) studies 3022 firms and concludes that evidence is consistent with economies of

scale as a determinant of corporate hedging policy. Consequently, the study finds that hedging firms are significantly larger than non-hedging firms. Geczy, Minton and Schrand (1997) suggests that firms with large economies of scale are more likely to hedge their foreign exchange exposure. Wysocki (1996) investigates the managerial motives for derivatives use using a sample of 403 US firms and finds that derivative use increase with increase in the size of the firm. Fok, Carrol and Chiou (1997) find that large firms have more propensities to use derivatives for hedging. Large firms have access to large asset base that provide sufficient security for large debt capital. This also allows the firm to negotiate better interest rates than smaller firms. Large firms are more likely to engage in international trade and are likely to be engaged in dealing with many currencies. Many large firms are engaged in commodity trade and have access to international commodity exchanges. Typical large firms are public firms with diffused shareholding and with separate ownership and management setting the state for agency relationships. The largest firms in any country are the ones registered at the security exchanges. Finance theory therefore hints that large firms are likely to engage in hedging and therefore the utilization of various techniques of hedging including employment of derivative usage.

Studies have found that there is a positive relation between firm size and use of derivatives. Large companies are more likely to enjoy economies of scale in hedging. Hedging with derivatives involve significant set-up, monitoring and skills costs to be effectively employed. Cost benefit analysis of hedging should ordinarily discourage small firms from using derivatives as part of risk management instruments. Transaction cost of hedging which include cost of trading and informational systems enabling costs favour

larger firms than smaller firms as confirmed by Haushalter (2000). Nance, Smith & Smithson (1993) suggests that firm size by itself is not a measurable determinant of derivative use but may affect hedging from specific angle. Most studies agree that larger firms are more likely to hedge with derivatives. However, one study by Ang, Chua and McConnel (1982), find that small companies have higher probability of facing financial distress and going bankrupt and are more likely to resort to hedging. Guay and Kothari (2003), find conclude that while hedging is positively related to company size, even large companies find little economies of scale in carrying out hedging effectively.

Firm size is considered as a moderating variable in this study. The overwhelming rationale is that large firms under identical circumstances are likelier to hedge than small firms. The proxy for firm size is normally confused with firm value. Many studies have used differing proxies to measure firm size: Book Value of Assets, Market Value of Equity plus Total Debt scaled by Book Value of Assets or in some cases Book value of Total Sales (Ahmed & Haris, 2012). Since size in market capitalization is more sustainable, the proxy for firm size in this study is book capitalization.

2.4.8 Industry Type

In theory some industries are more likely to engage in risk management than others. The Oil and Gas Industry is more has access to the international commodity markets trading in derivatives. Oil futures are readily available to investors as well as companies creating a belief that since investors can manage their own risk such companies do not find value in engaging in derivative usage. According to Tufano (1996), 85% of Gold mining firms in the United States use derivatives for managing their risk. According to Jin and Jorion

(2007) study the gold mining industry in North America and concluded that the companies have varying hedging practices. While some major companies hedged their gold prices with derivatives, others avoided the use of derivatives altogether. Callahan (2002) studies the effect of hedging on stock prices of North American Gold Mining Firms. The study gives various reason for examining the particular industry including; the firms in the same industry facing similar exposure, the firms use various financial instruments to manage risk, the industry is an actively traded volatile commodity busy and most importantly the firms disclose their practices in detail.

Industry differences are important in explaining risk management practices. Companies exposed foreign exchanges in their operations are theoretically more likely to hedge due to the unique exposure they face. The presence of foreign sales indicates that the firm has a motive to manage exposure to foreign exchange fluctuations. The firm may use traditional methods of hedging that include leading and lagging as well as matching cashflow positions against one another. The availability of the basic vanilla type derivatives is powerful attractions use them. Airlines are exposed not only to foreign exchange risk but also price risk of Jet fuel, which is traded in the international market. In a very current research, Isin, Gyoshev and McMeeking (2014) study the hedging practices of international airlines from 2000-2012. Airlines according to their study are exposed to the availability and price of risk, hedge the risk of jet fuel prices with various derivative instruments and do not speculate the derivative instruments and do not benefit from natural hedge because any benefits from the market dynamics are shared by the whole industry while risk of fuel prices are faced by individual airlines. These unique characteristics make airlines ideal industry to investigate for purpose for their study.

Studies in this area are aware to the industry effect in both exposure to volatility and type of derivatives used. Hentschel and Kothari (2001), control for industry effects by dividing firms on financial and non-financial firms and the grouping non-financial firms to 13 different industries to examine the effects of derivative use on risk management of each industry. Bodnar, Hayt, Marston and Smithson (1995), Bodnar, Hayt and Marston (1996) and Bodnar, Hayt and Marston (1998), showed that mining and commodities applied derivatives widely as compared to Wholesale and Retail and Agriculture. Geczy, Minton and Schrand (1997), as part of wider conclusions about foreign exchange hedging point out that, companies with larger economies of scale and higher exposure hedge their positions with derivatives.

Industry effect is therefore important in the usage of derivatives. Industry in this case is used as a moderating variable to examine whether belonging to specific industry increases a firm's motive for hedging. Controlling for Industry effect increases the robust nature of the results. Allayanis and Weston (2001), control for industry effect by constructing industry adjusted Tobin Q as measure of firm value. Industry differences can be accounted by using industry-adjusted proxies but this has the effect of incorporating high outliers in the average creating difficulties in coming up accurate regression values. Applying multinomial regression to understand the improvement of regression p-values for each variable is reduces the effect of outliers in the results. In this study, industry effect is applied as a moderating variable and multinomial logistic regression used to measure its effects on derivative use.

2.5 Summary of the Literature

The debate as to the determinants of derivative usage and firm's value is yet to be settled. There are numerous papers that find a relationship between firm value and hedging using derivatives (Allayannis & Weston, 2001; Graham & Rogers, 2002; Adam & Fernando, 2003). However there exists a mountain of literature that finds no relationship between hedging with derivatives and firm value (Mian, 1996; Tufano, 1996; Guay & Kothari, 2003; Bartran, Brown & Conrad, 2007; Jin & Jorion, 2006; Callahan 2002). Different samples, different timelines and different proxies for identical variables can explain the difference in viewpoint in literature.

According to Ammon (1998), empirical evidence is ambiguous on the dominant hedging motive. The hedging motive of a specific firm depends on the environment in which firms operate and on firm characteristics. A general trend one can observe from the existing literature is that: hedging taxable income is a concern for firms, firms with leverage and therefore a high probability of financial distress and financing costs are more likely hedge, firms with greater growth opportunities facing underinvestment problem are likely to engage in hedging, managers with common stocks hedge more than managers with option holdings, Information asymmetry contributes to the decision to hedge and high skilled managers hedge more than low skilled managers. The determinants of hedging that have been tested in empirical research include: Tax, Debt, Managerial utility, Underinvestment, (Haushalter, 2000; Allayannis & Ofek, 2001; Allayannis & Weston, 2001; Tufano, 1996; Nance Smith & Smithson, 1993; Mian, 1996; Geczy, Minton & Schrand, 1997; Ahmed & Haris, 2012).

2.6 Research Gaps

Ammon (1998) observes that empirical evidence is ambiguous on the dominant hedging motive of firms. The hedging motive of a specific firm depends on the environment in which firms operate and on firm characteristics. Most studies on theoretical determinants of derivative use were conducted in developed countries where exchange traded derivatives are abundant. It is hard to determine the real motives of the firm in employing derivatives. In the emerging economies, derivatives are traded OTC markets with financial institutions as the market makers. The difference in the supply side of financial derivatives affects determinants of derivative use among different firms.

In much of the literature, firm size is treated as a determinant of financial derivatives use. Although there is no definite consensus on the size factor in employing derivative instruments in risk management, some researchers believe that the mere fact of being a large motivates the firm to use derivatives in financial risk management. The size of the firm is given and is more likely to be a moderating rather than a determinant. Researchers have generally left the effect of industry type gapping. Several studies focus on specific industries, however, the cross-sectional comparative effects of different industry types has not been explored.

In the African context the most basic exchange traded derivatives; Forwards, Futures, Options and Swaps are yet to take root. South Africa is the only major market where Exchange-traded derivatives are available to firms and investors. Fadun (2013), states that no study has been undertaken on the use of derivatives as risk management instruments in Nigeria. While derivatives as seen as “necessary to enhance liquidity and mobilize the required capital for economic growth” the market for such financial

instruments is underdeveloped (Fadun, 2013). According to Tanui (2008), 56.8% of motor vehicle dealers in Kenya use forward contracts to hedge against foreign exchange rate. Mwangi (2007) suggests that lack of derivatives at the Nairobi Securities Exchange contributes to the slow pace of financial innovations in the African continent. This review has not encountered any study on the determinants and motives of derivative usage as risk management tools and extent of use of derivatives in the Kenyan market. This study examines the determinants of derivatives use among companies listed at the Nairobi Securities Exchange. The unique research gap being addressed by this study is the complete absence of consensus on the determinants of derivative use and the limited research on the issue in Africa. This study fills gap by unearthing evidence for Kenya on the determinants of financial derivatives by non-financial firms listed at the Nairobi Securities Exchange. The unique contribution of this study is the analysis of moderating effect of industry type and firm size on the determinants of derivative use.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents the procedures used to collect data and then present it in a way that meets the research objectives and answer the research hypotheses. The chapter contains the methodology applied to collect data and the techniques used for data processing and analysis. Section 3.1 and 3.2 discuss the research philosophy and research design employed in the study and also gives justification for the choice of research design. Sections 3.3 to 3.8 describe the population, sampling frame, sample and sampling technique, data collection instruments, data collection procedure, pilot testing and data processing and analysis.

3.1 Research Philosophy

Research philosophy is the development and nature of knowledge and contains vital assumptions about researchers' view of the world (Saunders, Lewis & Thornhill, 2007). According to Burrell and Morgan (1979), developing philosophical perspectives require that a researcher should hold core assumptions on two important dimensions; nature of science and nature of society. Nature of science dictates that either one holds subjectivist viewpoint or objectivist viewpoint. Objectivism is the basis for realism in ontology, positivism in epistemology, determinism of human nature and the application of nomothetic methodology for solving research problems. Ontology relates to nature of reality; either things have existence or they are a product of one's imagination. Epistemology is concerned with nature, validity and limits of inquiry (Rosenau, 1992).

This concern is how humans can gain knowledge of the world. Human nature has two equally opposing dimensions; either human being has control or they are controlled by circumstances. Determinism assumption accords human beings the free will to acquire knowledge to improve their circumstances or explain phenomena around them. Methodology is the tools available to the researcher to make an inquiry into nature of things. Reality is objective and out there to be discovered through analysis and inferences. This forms the basis for the present research without taking extreme view of realism as to deny the human biases that ultimately creep into the objective stance required for inquiry. In this study, research proves or disproves formulated hypothesis through collection of data, modeling and analysis.

3.2 Research Design

Research design is the procedure for collecting, analyzing, interpreting, and reporting data in research studies. According to De Vaus (2001), Research design is defined as the overall strategy that employed to integrate different components a study into coherent and logical manner in order to ensure that the study effectively address the research problem. Research design constitutes the blueprint for collection, measurement, and analysis of data. Research design is the methodology and procedure employed to carry out scientific research. Burns and Grove (2003), define research design as a blueprint for undertaking research that gives maximum control over factors that may interfere with validity of the research findings. Research design refers to the overall conception of the study including description of all concepts, variables and categories, the relational propositions and

methods of data collection and analysis (Mugenda, 2008). Accordingly research design is a process that a researcher follows from inception to completion of a study.

Research design is also defined as the structure that guides the execution of a research method, and the subsequent analysis of acquired data. The choice of the research design depends on how much is already known about the research problem (Bryman & Bell, 2007). Cooper and Schindler (2011), concede that there are numerous definitions of research design, but there is no single definition that imparts the full range of important aspects.

In this study, exploratory design is utilized in the collection, analyzing, interpreting, and reporting the results. First qualitative data is used to provide background and context for the study using of primary data. Secondly, Exploratory research design is employed to answer the six objectives of the research objectives using secondary data, since the choice of research design is informed by how much is known about a particular problem. Derivative usage research is relatively new in Kenya especially in applying extensive data to determine the motives for hedging. Exploratory research design is applied where little is known about the field under research (Stebbins, 2001). This study explores the determinants of derivatives usage among companies in Kenya. The goal of exploratory research is to discover ideas and insights and generate hypothesis on the phenomenon under study. In this research the basic research question answered is what determines the use derivatives among firms listed at the Nairobi Securities Exchange. In the research, both experience surveys and secondary data analysis were used which are ideal for exploratory research design.

3.3 Population

Cooper and Schindler (2011) define population as the total collection of elements about which a researcher makes inferences. Kombo and Tromp (2011) also define a population as a group of individuals, objects or items from which samples are taken for measurement in a study. Kothari (2011) defines population as the “researcher’s universe” indicating that population as all items in any field of inquiry.

The target population of study covers all the firms listed at the Nairobi Securities Exchange. The NSE is considered a broad based representation of Kenyan firms across industries. There are 62 firms listed at the Nairobi Securities Exchange at the time of undertaking this study, as laid out in Table 3.1. These firms are categorized into twelve sectors as: Agricultural (7), Automobiles and Accessories (4), Banking (10), Commercial and Services (8), Construction and Allied (5), Energy and Petroleum (5), Growth Enterprise Market Segment (2), Insurance (6), Investment (5), Investment Services (1), Manufacturing and Allied (7) Telecommunication and Technology (2).

This population is ideal for this research because listed firms are usually large and have well developed risk management functions. Listed firms also encompass many industries and are the most active in their sectors. Listed firms are regulated and are required to publish their annual reports with sufficient disclosures in notes of any risk management practices used and exposures in any particular year. cursory analysis of annual reports shows that listed firms comply with IFRS 39 and IFRS 7 disclosure requirements for risk management instruments. Public companies also have more agency problems than small owner–manager firms and large family owned enterprises since ownership and management are separated. To overcome the size restriction of the population, secondary

data was collected for five years from 2008 to 2012. This period was selected because it was just after the financial crisis of 2007 which was blamed on the usage of financial derivatives by the finance industry. It was expected that derivative use in this period will only apply to risk management and not speculation. It is also the period in which the NSE began preparations for the introduction of derivatives instruments. More practically, the period of the study is highly dependent on the ease and completeness of data. The five year data results in 310 firm-year observations providing sufficient observations from the sample.

Table 3.1: Target Population

No.	Industry	Number of firms	Percentage
1	Agricultural	7	11.3
2	Automobiles and Accessories	4	6.5
3	Banking	10	16.1
4	Commercial & Services	8	12.9
5	Construction & Allied	5	8.1
6	Energy & Petroleum	5	8.1
7	Insurance	6	9.7
8	Investment	5	8.1
9	Investment Services	1	1.6
9	Manufacturing & Allied	7	11.3
10	Telecommunication & Technology	2	3.2
11	Growth Enterprises Market Segment (GEMS)	2	3.2
Total Number of firms listed		62	100.0

3.4 Sampling Frame

A list of firms listed at the Nairobi Securities Exchange is used as the sampling frame. The list of the firms listed at the NSE is a comprehensive representation of regulated firms with reporting capabilities that adhere to international reporting standards. The firms are balanced across industries and sectors providing a sample that can be used for generalizing for all firms in Kenya. There are a total of 62 firms listed at the NSE. Preliminary examination shows that all the annual results of listed firms can be obtained online, purchased from the NSE or obtained from the NSE Handbook published annually by the bourse.

3.5 Sample Size and Sampling Technique

A sample is a subset of the population of interest from which general inferences can be made for the entire population (Sekaran & Bougie, 2010). This is the size of a portion of the whole population selected for the purpose of carrying out a study. The quality and representativeness of the sample affects the quality of the research generalizations (Patten, 2004). The larger the sample size, the greater the probability the sample will reflect the general population. However, sample size alone does not constitute the ability to generalize (Nesbary, 2000). Obtaining an unbiased sample is the main criterion when evaluating the adequacy of a sample (Patten, 2004). Peng, Lee and Ingersoll (2002), discovered that there is very little guidance in relation to sample size for logistic regression analysis.

Purposive sampling was employed in this study to enable the study to concentrate on non-financial firms in the population. When selecting subjects that meet certain predetermined criteria, purposive sampling provides the best approach (Kothari, 2011).

This study employs a combination of survey and analysis of annual reports for 2008, 2009, 2010, 2011 and 2012 of the firms listed at NSE. Information collected through survey is validated through analysis of annual reports. While a company may identify itself as a hedger in the survey, the company may not have any hedged position in the years under study. This means only firms with hedged positions in any of the five years is identified as a hedger.

A sample of 31 companies was deemed sufficient for this study. The population of the study is all the firms listed at the NSE. There were 62 firms listed at the NSE in the period of the study. A total of 16 Financial Firms including banks and Insurance companies were excluded from the sample. Banks are on the supply side of the equation and act as market makers. Their motivation for using derivatives is driven by profitability rather than risk management. Insurance firms may engage in derivative usage as counterparties for purpose of revenue generation rather than risk management and are fundamentally different from commercial and industrial firms. A total of six (6) Investment companies were also excluded because they invest in other firms listed at the stock exchange and their performance and operation activities are highly correlated with other firms. Two (2) Growth Enterprise Market Segment (GEMS) were excluded on account of being new introductions in to the securities exchange. Of the remaining 38 firms which fit the requirements of the study as indicated on Table 3.2, seven (7) firms had no complete data in the period of the study.

Table 3.2: Sample Distribution for Firms

No.	Industry	Total firms in industry	in Sample	Percentage
1	Agricultural	7	7	18.42
2	Automobiles and Accessories	4	4	10.53
3	Banking	10	0	0.00
4	Commercial & Services	8	8	21.05
5	Construction & Allied	5	5	13.16
6	Energy & Petroleum	5	5	13.16
7	Insurance	6	0	0.00
8	Investment	5	0	0.00
9	Investment Services	1	0	0.00
9	Manufacturing & Allied	7	7	18.42
10	Telecommunication & Technology	2	2	5.26
11	Growth Enterprises Market Segment (GEMS)	2	0	0.00
	Total Number of firms listed	62	38	100.00

In order to relate the primary data to the secondary data, firms whose annual reports were not available for the period 2008-2012 were removed from the sample reducing the respondents to 62 as shown on Table 3.3. A manager was included in the sample if the function undertaken in the firm included risk management which is primary undertaken under the finance department. Where the company did not have risk management department, persons heading finance or related functions were included.

Table 3.3: Sample Distribution for Respondents

No.	Industry	Total firms	Sample Size	Total Respondents
1	Agricultural	7	6	12
2	Automobiles and Accessories	4	2	4
4	Commercial & Services	8	6	12
5	Construction & Allied	5	5	10
6	Energy & Petroleum	5	4	8
9	Manufacturing & Allied	7	6	12
10	Telecommunication & Technology	2	2	4
	Total Number of firms listed	38	31	62

3.6 Data Collection Instruments

Two types of data were collected for this study; primary and secondary data. A questionnaire was utilized in collecting Primary data Secondary was obtained from annual reports and notes to the financial statements using secondary data sheet.

A questionnaire is a tool of data collection that consists of a preformatted set of questions printed or typed in a definite order on a form or set of forms (Kothari, 2011). A questionnaire is defined preformulated written set of questions to which respondents record their responses with defined parameters (Sekaran & Bougie, 2010). Questions in a questionnaire can be classified into two types; closed-ended questions and open-ended questions. Closed-ended questions give alternative responses for the respondents to choose from, in many cases the responses are measured on a certain scale. Open-ended questions allow respondents the freedom to answer the question any way they choose. The survey questionnaire employed in the study is a modification of the survey at Wharton School Business which was conducted to gauge the usage of derivatives among

non-financial firms in the United States (Bodnar, Hayt, Marston, & Smithson, 1995). The advantage of using such a tool is that it allows for international comparison. The same tool has been used with localized modifications in New Zealand (Berkman, Bradbury & Magan, 1997), the United States (Howton & Perfect, 1998), Netherlands (Bodnar, de Jong & Macrae, 2003), in Sweden (Alkebäck, Hagelin, & Pramborg, 2006), in the U.K. (El-Masry, 2006), in combined dataset of Hong Kong and Singapore (Sheedy, 2006), in Denmark, Finland, Iceland, and Sweden (Brunzell, Hansson & Liljebloom, 2009) and in South Africa (Correia, Holman, & Jahreskog, 2012)

The questionnaire contains structured questions that provide clear choices for the respondent. This was intended to save time for the respondent and increase the probability of a response.

Secondary data sheets were formulated appropriate for the purpose of this study. The study involved collection of financial data from annual reports of companies listed at the securities exchange. Annual reports of most quoted companies are public documents that can be accessed from multiple sources including company websites and the Nairobi Securities Exchange.

3.7 Data Collection Procedures

Data for this study was collected from two sources: Secondary data obtained through a review of annual reports and notes to the financial statements for period 2008 to 2012 and primary data acquired through a survey of firms listed on the Nairobi Securities Exchange.

3.7.1 Secondary Data

Secondary data was collected by hand using annual reports of the firms listed at the NSE and the *NSE Handbook* published annually for the period 2008 to 2012. Extensive Information on derivative use among firms listed at Nairobi Securities Exchange was collected by hand from the annual reports published in a five year period. Where information was not available in the annual reports, the *NSE handbook* was used to obtain the required data. The annual reports of 31 firms were obtained for the period from 2008 to 2012 resulting in firm-year observations or datasets of 155 over the five year period. Annual reports disclose detailed information on various aspects of their operations for their shareholders. Data from annual reports are readily available, more reliable and regulated with required disclosures. Annual reports data does not suffer response bias and where available has high validity. Firms listed in the securities exchange are encouraged to disclose use of derivatives as a requirement of IFRS 39 and IFRS 7. Phrases like “The company uses derivative instruments to manage risk” in the notes to the financial statements in the annual reports indicate derivative usage. Other firms report the absolute value of derivative instruments used. Firms were categorized into Derivative Users (DU) and Non-Users (NDU) based on the disclosures in their annual reports.

Table 3.4: Distribution of Annual Reports Sample across Industry

No.	Industry	Total firms	Sample	Percentage
1	Agricultural	7	6	22.58
2	Automobiles and Accessories	4	2	6.45
3	Commercial & Services	8	6	19.35
4	Construction & Allied	5	5	16.13
5	Energy & Petroleum	5	4	12.9
6	Manufacturing & Allied	7	6	16.13
7	Telecommunication & Technology	2	2	6.45
	Total	38	31	99.99

3.7.2 Primary Data

In the survey, 62 questionnaires were delivered by hand to managers involved in risk management decisions among firms listed at the Nairobi Securities Exchange. The questionnaire was designed in two formats; a hard copy delivered by hand and soft copy that can be filled automatically without need for downloading. Low response rate has been the undoing of surveys in many research studies and every effort was made to increase to avert it. To enhance the level of response, the questionnaires were hand-delivered by research assistants and also emailed as soft copy to the respondents. Follow up calls and regular reminders were used to encourage a higher response rate.

3.8 Pilot Test

Main objective of the pilot study is to assist the researcher to check the performance of the research instrument before using it to collect data. According to Zikmund, Babin, Carr and Griffin (2010) and Saunders, Lewis and Thornhill (2007), the objective of pilot testing a questionnaire is to establish the appropriateness of the research design and

accuracy of the data collection instrument. The importance of the pilot test is to remove ambiguity in the intended meaning of any of the questions, correct errors of fact and enhance the relevance of the information collected. Cooper and Schindler (2011) agrees that the rationale for a pilot test is to identify weaknesses in design and execution Pilot testing is indispensable for testing the reliability of instruments and the validity of the study. In a nutshell, a pilot test confirms if the questions in the questionnaire measure what they are supposed to.

Once the questionnaire was formulated, formatted and edited, it is given trial run out on the field. This is called pre-testing the questionnaire. The questionnaire was pretested to a selected sample similar to the actual sample which was used in the study. Procedures used in pre-testing the questionnaire were identical to those ones used during the actual data collection. Pre-testing the questionnaire is essential because comments and suggestions from respondents at pre-testing stage are considered and incorporated into the final questionnaire to improve the quality of the data collected. Vague questions and irrelevant answers are exposed in the sense in the manners that respondents interpret each question. To enhance uniform understanding of the information, the questions or statements are rephrased so that they convey the same meaning to all respondents. The rule of thumb in pilot testing has been one percent of the sample is applied since time, costs and practicability of carrying out the exercise limit its scope (Cooper & Schilder, 2011).

The instrument in this research was pretested by mailing it to 10% (6 respondents) of the sampled companies. This was done because of the size of the sample which was small.

The response rate was enhanced through regular reminders and resending the questionnaire online. The results obtained were analyzed for reliability and validity.

3.8.1 Reliability

Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials. The instrument was analyzed using Cronbach Alpha. The Cronbach Alpha, in a scale of 0 to 1, is used to measure the degree of reliability. An instrument with an alpha of 0.7 and above is interpreted as reliable. Anything lower is deemed unreliable and the tool will be edited to increase its reliability and pretested again until it conforms to the required reliability standard.

Summary Results of the reliability tests are laid on table 3.5. The results are based on the questionnaires which were self administered to respondents. The items in the questionnaire had high Cronbach alpha which indicates higher levels of internal consistency. When the Cronbach is between 0.6 to 0.7 it is considered adequate for a newly developed tool in non-clinical studies. It can be noted that the overall coefficients were adequate and therefore the internal consistency of the questionnaire as a whole was sufficient. The statements for each of the variables were also tested.

Table 3.5: Measurement of Reliability Results

Variables	Number of Items	Cronbach's Alpha(α)
Use of Derivatives	3	0.717
Determinants of Derivative Use	2	0.725
Currency Derivatives	5	0.716
Interest Rate Derivatives	2	0.707
Commodity Price Derivatives	2	0.716
Policies and Procedures	5	0.705

3.8.2 Validity

Validity is the degree to which the results obtained from the analysis of the data actually represent the phenomenon under study. Two types of validity are vital. Content validity will be ensured by discussing the tool with research area experts like the research supervisors and other stakeholders and through literature review. Ensuring the sample is a representative of the population as much as possible enhances sampling validity also known as external validity. Appropriate sample size and stratification was carried out using the results of the pilot study.

The validity of the questionnaire was evaluated by discussing the contents of the questionnaire with two randomly selected risk managers. The selected persons were asked to evaluate the statements in the questionnaire for relevance and whether they are meaningful, clear and free of any offensive phrases. On the basis of the evaluation, the questionnaire was adjusted appropriately before subjecting it to the final data collection exercise. Their review comments were used to ensure that content validity was enhanced.

This study used both construct validity and content validity. For construct validity, the questionnaire was divided into several sections to ensure that each section assessed information for a specific objective, and also ensured that the same closely tied to the conceptual framework for this study.

3.9 Data Processing and Analysis

3.9.1 Introduction

This section presents how the data was cleaned processed, presented and methods that will be employed in data analysis. Primary data obtained through questionnaire was cleaned sorted and coded in preparation for analysis.

Sekaran and Bougie (2011) suggest that data analysis is performed to achieve three primary objectives; getting a feel for the data, testing the goodness of fit of the data and testing the study hypothesis. This study achieves the first objective by analyzing descriptive statistics including response rate, frequency distribution, mean and standard deviations of both the primary and secondary data. The second objective is tested through carrying out reliability tests using Cronbach's alpha as laid out in table 3.5. The study achieves the third objective using statistical tests, structural equation modeling, correlation analysis and binary logistic regression.

3.9.2 Descriptive Analysis

Primary data was analyzed using descriptive statistics to provide background data for the more rigorous testing of the secondary data. Descriptive analysis was carried out to provide a general insight into the risk management practices of firms listed at the Nairobi Securities Exchange. These descriptive statistics helps make initial inferences about the

data. Inferences from the primary data are use along with secondary data for completeness of analysis in this exploratory study. Secondary data was also analyzed using Descriptive Methods to provide a feel for the data. The tools that were used to describe the data should include; Percentages, Mean, Median, Standard Deviation and Percentiles.

3.9.2 Inferential Analysis

Inferential analysis deals with drawing conclusions and making generalizations and predictions about the properties of a given population based on information obtained from a sample. Inferential Analysis was performed to infer generalization from the data and answer the objectives of the study. Independent T-Test, Correlation Analysis, Logistic Regression and Moderation Analysis were carried out.

3.9.2.1 Independent T-Test

An independent-samples t-test was conducted to compare the means of predictor variables for derivative users and nonusers. Independent T-Test is used to make inferences about the mean. Independent t-test is deemed suitable because data being analyzed is parametric, unrelated and small (Bryman & Cramer, 1997). These tests describe difference in means between hedgers and non-hedgers for various firm-level characteristics. A t-test finds out if there is a significant difference in average means of one continuous or dichotomous group versus another and finds the significance of that relationship. In this case the data to be collected is mainly ratio in nature and a t-test is found to be a suitable measure.

3.9.2.2 Correlation Analysis

To compliment the independent t-test a correlation test was carried out using Pearson's correlation coefficient. Pearson's correlation is perceived as the most common measure of linear correlation when nature of variables is interval or ratio (Sprčić, 2007).

3.9.2.3 Logistic Regression Analysis

According to Peng, Lee and Ingersoll (2002), logistic regression is well suited for describing and testing hypotheses about relationships between a categorical outcome variable and one or more categorical or continuous predictor variables. According to Pedhazur (1997) when the objective of the study is to better understand how a set of descriptors explains an outcome, regression analysis is applicable. In cases where the dependent variable is dichotomous, Menard (2002) and Pampel (2000) recommend the use logistic regression analysis. Binary Logistic Regression is used where the dependent variable is dichotomous and the predictor variables are a mix of categorical and continuous variable and the data is not normally distributed. Logistic Regression does not make assumptions about the distribution of the independent variables.

In this study Binary Logistic regression was employed because the use of derivatives is the dependent variable which is a binary, dichotomous measure which was coded "1" for firms that engage in hedging with derivatives and "0" for firms that do not engage in derivative use. Binary Logistic Regression was applied to predict the categorical variable from a set of predictor variables; debt, firm value, tax incentive, underinvestment and managerial ownership. The regression model predicts the natural log of the odds ratio of either belonging to the derivative user or the non-derivative user group.

Binary Logistic analysis generates various parameters used to measure the efficiency of the model in measuring the relationship between the variables. An intercept only model, called Block 0 is first run to establish if the predictors will add any contribution to the analysis.

Omnibus Test is used for model comparison between the intercept only and the full model. If the test is significant, addition of independent variables to the model will contribute the ability to measure the envisaged relationship. -2loglikelihood Test measures how poorly the model predicts the classification of the variables. Smaller value of -2loglikelihood Test statistic indicate model's predictive capacity. Two different measures; Cox and Snell R^2 and Nagelkerke R^2 attempt to measure the model's R^2 . The higher values for these measures the greater the goodness of fit of the model. Cox and Snell R^2 predictive capacity is limited by that fact it cannot rise to a maximum of 1. Nagelkerke R^2 however can reach a maximum of 1. These measures are considered pseudo R^2 and not the real measure and are used with consideration to sample size and as general directional guide.

The binary logistic regression table generates Wald Chi Square test that measures the unique contribution of each independent variable proxy, holding other variables constant. This limits the overlap between the variables in the equation. Standard Error in the logistic regression output measures if there is multicollinearity and other numerical errors in the data on any variable. The threshold for numerical an error is 2 and any results with standard error higher than 2 is not interpreted. The p values of the variables of the model

are used to interpret the results. The cut-off for inclusion into the final model and acceptance of the null hypothesis is 0.05.

This is a fairly common method used in empirical literature (Ahmed & Haris, 2012; Sprcic, 2007; Géczy, Minton & Schrand, 1997; Allayannis & Weston, 2007; Smith & Smithson, 1993). Logistic Regression model in this case measures the link between the odds that a firm uses derivatives and the determinants of derivatives use as measured by various independent variables.

Logistic regression was used here because normal OLS regression will not apply; the data expected will be limited, discrete and non-continuous which flouts the basic assumptions of OLS. Binary logistic model applied in the study generally takes the following form:

$$\pi = \frac{1}{1 + e^{-(\beta_0 + \beta_1 FV + \beta_2 Debt + \beta_3 UnderInv + \beta_4 MO + \beta_5 TAX)}}$$

Where:

π = the probability of success or p-value

β_0 = Constant

β_x = Coefficient for variable x

FV = Firm Value

Debt = Debt

UnderInV = Underinvestment

MO = Managerial Ownership

TAX = Tax Incentive

3.9.2.4 Moderation Analysis Technique

Moderation Analysis is applied when the outcome of the relationship between a dependent variable and Independent variable is impacted upon a third variable (Baron & Kenny, 1986). A moderator is a qualitative variable that influences the relationship between the dependent variable and Independent variable. A moderator variable impacts on the direction and magnitude of the relation between a predictor and an outcome (Fairchild & Mackinon 2009). The statistical tool used to measure moderation should test the differential effect of the independent variable on the dependent variable as a function of the moderator (Baron & Kenny, 1986).

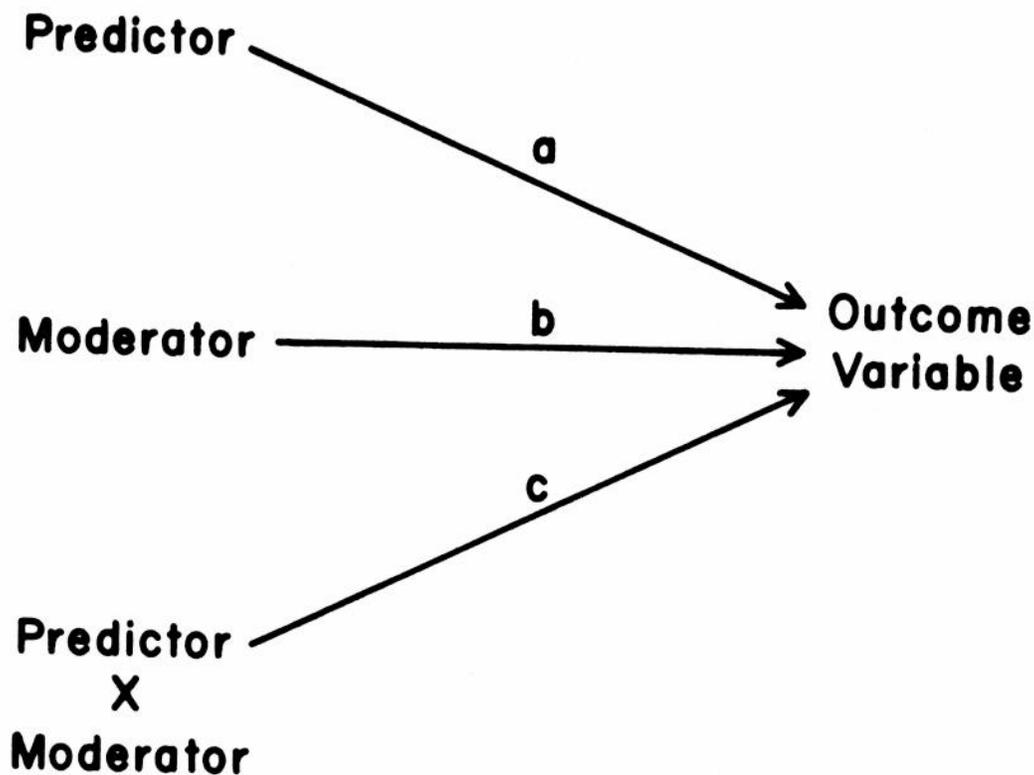


Figure 3.1: Moderator Model (Baron & Kenny, 1986)

The variables isolated using Binary Logistics Regression as determinants of derivative use were subjected to moderator analysis with two dichotomous moderators; Industry and Firm Size. For ease of analysis Firm Size was categorized and dummy coded into two categories as shown on table 3.6; either a firms was considered large (1) or small (0). The objective is to determine if size moderates the determinants of derivative use.

Table 3.6: Firm Size Categorization for Moderation Analysis

No.	Market Capitalization in Billions	Code	Number of Firm/Year Observations
1	0- 20	0	123
2	Over 21	1	32

Nairobi Securities Exchange classifies firms into seven (7) categories. For ease of analysis in this study, the sampled companies are classified into two categories manufacturing and non-manufacturing. For the categorization and analysis are dummy coded as “1” for Manufacturing and “0” for non manufacturing as per Table 3.7.

Table 3.7: Industry Classification for Moderation Analysis

No.	Industry Classification	Code	Number of Firm/Year Observations
1	Manufacturing	0	30
2	Non- Manufacturing	1	125

The moderated model takes the following general form:

$$\pi = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_{12} X_1 M + \beta_{13} X_2 M)}}$$

Where $\beta_{12} X_1 M$ and $\beta_{13} X_2 M$ are the interaction terms.

3.9.3 Operationalization of Variables

Table 3.8 provides detailed definition of variables, their proxies and measures. It also shows predicted relationship between the proxies and their Dependent Variable. The study focused on two variables as moderators in the relationship between the dependent variable and the independent variables. Firm Size and Industry are dummy coded as shown

Table 3.8: Variables and their proxies and measures

Type of Variable	Variable	Proxy	Measurement
IV	Firm Value	Market to Book Value Book Value of Sales Tobin Q	MVE/BVA Log of BVS MVE/MKT Cap
IV	Debt	Financing Cost Financial Distress Cost Leverage	Interest Cover Ratio= $\ln(\text{EBIT}/\text{INT})$ $\text{AltZ}=0.21\text{X}_1+0.014\text{X}_2+0.033\text{X}_3+0.006\text{X}_4+0.999\text{X}_5$ BVD/MVE
IV	Tax Incentive	Differed Tax	1 if Present 0 if Not
IV	Underinvestment	Investment Expenditure	Log of Inv. Expenditures
IV	Managerial Ownership	Dividend Payout Debt Ratio Directors Remuneration Management Shareholding	Log of DPS/EPS Debt ratio Log of Directors Remuneration Management Shares/Total Shares
DV	Derivative Use	Binary	Derivative User = 1 Non-User = 0
MV	Firm Size	Market Capitalization	Dummy Coded “1” for Large; “0” for small
MV	Industry	Industry Type	Dummy coded “1” for Manufacturing; “0” for non-manufacturing

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

The study investigates the determinants of derivative use among firms listed at Nairobi Securities Exchange. Specifically, this study examines the influence of Firm Value, Debt, Underinvestment, Tax Incentive and Managerial Ownership on the decision to use derivatives among firms listed at the Nairobi Securities Exchange. This study also investigated the moderating effects of firm characteristics on the decision to employ derivatives by Kenyan publicly listed firms. Primary data was collected using questionnaires and secondary data collected was obtained by hand from the annual reports of companies listed at the Nairobi Securities Exchange for the five years 2008 to 2012. The previous chapter covers the methodology used to achieve the stated research objectives. This chapter sets out the findings and discussions of the study and attempts to test the hypotheses derived from the research objectives. It begins by providing the context of derivative use using the results obtained from the analysis of the primary data. The chapter then lays out the results of each objective using the analysis of secondary data.

4.2 Response Rate

AAPOR (2016), defines response rate is the rate of complete questionnaire with reporting units divided by the number of eligible reporting units in the sample. A total of 62 questionnaires were sent to respondents for filling out of which a total of 57 questionnaires were returned. The response rate therefore was 91.9%. Five (5)

questionnaires were not returned. Mugenda and Mugenda (2008) posited that, a response rate of 50% is acceptable for analysis. A response rate of over half is good while over 70% is very good (AAPOR, 2016). According to Bailey (1996) a response rate of 75% is sufficient for data analysis and Chen (1996) argues that the larger the response rate, the smaller the non-response error. The response rate was excellent at 91.9% and therefore it was sufficient for analysis.

Table 4.1: Response Rate

Response Rate	Frequency	Percentage (%)
Returned	57	91.9
Unreturned	5	8.1
Total	62	100

4.3 Sample Profile

The sample was drawn from firms listed at the Nairobi Securities Exchange. Firms listed at the Nairobi Securities Exchange are considered as large companies with well developed risk management characteristics and in diverse industries. Much of the profile of firms included in the sample was incorporated into the sample development in chapter there. The study collected limited amount of biographical profile of the respondents to paint a general picture about the sample. Questionnaires were sent to a sample of 62 informants drawn from 31 firms listed at the Nairobi Securities Exchange, however, 57 of the 62 questionnaires were returned. This represents a study response rate of 91,9%. Table 4.2 below presents a summary of the respondents' gender profile. The responses to the questionnaires revealed that 17 (29.8%) respondents were female and 40 (70.2%) respondents were male indicating that males dominated the sample of respondents.

Table 4.2: Gender Profile of the Sample

Gender	Respondents	% of the total
Male	40	29.8
Female	17	70.2
Total	57	100

The designations of the respondents included Risk Managers, Credit Controllers, Financial Controllers, Financial Analysts and Chief Accountants. Table 4.3 shows the respondents experience in the firm they worked at the time of the survey. The findings revealed that a majority (75.4%) served over five years in their current firm and a majority

Table 4.3: Respondents Experience in the Firm

Experience in the Firm	Respondents	% of the total
One	3	5.3
Two	5	8.8
Three	4	7.0
Four	2	3.5
Five or more	43	75.4
Total	57	100

Table 4.4 indicates that a majority (57.9%) of the respondents had more than five years' experience in the industry where they work making the respondents highly experienced and able to respond to the survey

Table 4.4: Respondents Experience in Industry

Experience in Industry	Respondents	% of the total
One	5	8.8
Two	7	12.3
Three	7	12.3
Four	4	7.0
Five or more	33	57.9
Total	57	98.2

4.4 Descriptive Results

The study carried out descriptive statistics for the general background and the independent variables in order to achieve the stated objectives of which is to analyze determinants of derivative use among firms listed at the Nairobi Securities Exchange. Like exploratory studies of its nature, the study first presents general characteristics of derivative use among firms listed at the Nairobi Securities Exchange from the primary data collected and then presents descriptive analysis of each Independent Variable using the secondary data collected from annual reports of the sampled firms.

4.4.1 Descriptive Results for Derivative Use Among Firms Listed at NSE

A survey was conducted in order to provide detailed background data on derivative use and risk management characteristics of firms listed at the Nairobi Securities Exchange for the study. The survey results were not used to answer the specific objectives or test the hypothesis formulated but to understand the context of derivative in the Kenyan environment. Primary Data was collected for hedging strategies, motivation for derivative use, use of currency derivatives, use of interest rate derivatives, use of commodity

derivatives and policies and procedures of derivative use. The result of the survey is presented as follows.

4.4.1.1 Hedging Strategies used by firms listed at NSE

The study sought to find out the hedging strategies used by companies listed at the Nairobi Securities Exchange. In order to provide to obtain complete response on various strategies, seven major strategies were provided. The respondents were asked to indicate the hedging strategies used by their companies for financial risk management. The findings of the study were summarized in Table 4.5. From the table, a majority (64.9%) of the respondents strongly agreed that their companies borrow in the same currency as asset risk denomination. A bigger majority (98.2%) agreed that their companies engineers flexibility into companies operations. A 50.9% agreed that their companies use diversification of business lines as a strategy. On the use of derivatives (Forwards, futures, options and swaps) as a strategy, 29.6% agreed that their companies use derivatives. Further, 64.9% agreed that their companies utilize matching operations costs and revenues in the same currency strategy. 68.4% of the respondents agreed that their companies use optimization of insurance policy strategy. Lastly, 35.1% strongly agreed that Risk Sharing and joint ventures is the strategy used in the companies they work for, for financial risk management.

Table 4.5: Hedging strategies for financial risk management

Hedging Strategies	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total %
	F	%	F	%	F	%	F	%	F	%	
Borrowing in the same currency as asset risk denomination							20	35.1	37	64.9	100
Engineering flexibility into companies operations							56	98.2	1	1.8	100
Diversification of business lines			18	31.6			29	50.9	10	17.5	100
Use of derivatives (Forwards, futures, options and swaps)	19	35.3	19	33.3	1	1.8	37	29.6			100
Match operations costs and revenues in the same currency			37	64.9			20	35.1			100
Optimization of insurance policy			39	68.4			18	31.6			100
Risk Sharing and joint ventures	2	3.5	17	29.8			18	31.6	20	35.1	100

4.4.1.2 Motivation for Derivative Use among firms listed at NSE

The objective of the study is to analyze the determinants of derivative use. The study asked the respondents to rate specific motivations for hedging with derivatives in their companies. The findings were summarized in Table 4.6. From the table, 42.1% of the respondents agreed that they do Hedging against Financing Cost. A majority (52.6)

agreed that they their firm do Hedging against Financial Distress. The findings further revealed that 36.8% their firms do hedging with derivatives to Enhance Market Value of the firm. 43.9% indicated their reason for hedging with derivatives was for Tax Incentive. Further, 42.1% agreed that their reason for hedging with derivatives was to increase access to debt capital for growth and 33.3% agreed that they do hedging with derivatives to increase profitability through derivative trading.

Table 4.6: Reasons for hedging with derivatives

Factors that inform decisions		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total %
		F	%	F	%	F	%	F	%	F	%	
Hedging Cost	Financing	5	8.8	12	21.1	0	0	24	42.1	16	28.1	100.0
Hedging Distress	Financial	2	3.5	11	19.3	0	0	30	52.6	14	24.6	100.0
Enhancing Firm Value		9	15.8	15	26.3	0	0	21	36.8	12	21.1	100.0
Tax Incentive		7	12.3	16	28.1	0	0	25	43.9	9	15.8	100.0
Underinvestment		5	8.8	19	33.3	0	0	24	42.1	9	15.8	100.0
Increase profitability		11	19.3	19	33.3	0	0	18	31.6	9	15.8	100.0

The research further sought to establish respondents' levels of concern on issues relating to hedging with derivatives. The findings were tabulated in Table 4.7. The table shows 35.1% agreed that they were concerned about Credit Risk. A majority (54.4%) agreed that their concern was on issues relating to Accounting and Reporting treatment. A 36.8% strongly disagreed that they had concerns on Tax and Legal Issues. Also 33.3% strongly

disagreed that they were concerned with Transaction Fees. 42.1% agreed that they were concerned with issues relating to Liquidity Risk. 43.9% strongly disagreed that lack of knowledge about derivatives within the firm was their issue of concern. A majority 49.1% strongly disagreed that they had concern on issues such as difficult to quantify firm's underlying exposure. The findings further revealed that 47.4% of the respondents agreed that they had concerns on issues relating to perception by regulators, investors and public. A 43.9% also agreed that they were concerned on issues relating to pricing and valuing derivatives. A majority (50.9%) of the respondents strongly disagreed that monitoring and evaluating hedge results was an issue of their concern. A 54.4% majority strongly agreed that evaluating the risk of derivative transactions was an issue of concern for their firms.

Table 4.7: Level of concern on issues relating to hedging with derivatives

Factors that inform decisions	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total %
	F	%	F	%	F	%	F	%	F	%	
Credit Risk	10	17.5	17	29.8	1	1.8	20	35.1	9	15.8	100
Accounting and Reporting treatment	7	12.3	9	15.8	2	3.6	31	54.4	8	14	100
Tax and Legal Issues	21	36.8	18	31.6	0	0	12	21.1	6	10.5	100
Transaction Fees	19	33.3	17	29.8	0	0	16	28.1	5	8.8	100
Liquidity Risk	17	29.8	20	42.1	4	6.4	10	17.5	6	10.5	100
Lack of knowledge about derivatives within the firm	25	43.9	8	14	3	5.4	9	16.2	12	21.1	100
Difficult to quantify firm's underlying exposure	28	49.1	10	17.5	1	1.8	14	24.5	4	7	100
Perception by regulators, investors and public	6	10.5	27	47.4	0	0	18	31.6	6	10.5	100
Pricing and valuing derivatives	4	7	25	41.9	2	3.2	19	33.3	9	15.8	100
Monitoring and evaluating hedge results	29	50.9	14	24.6	0	0	12	21.1	2	3.5	100
Evaluating the risk of the derivative transactions	0	0	10	17.5	0	0	16	28.1	31	54.4	100

4.4.1.3 Use of Currency Derivatives

Respondents were asked to indicate how often they engaged in derivative transactions to mitigate specific risks to the organization. As Summarized in Table 4.9, results indicate that 87.7% of the respondents never engaged in currency derivative transactions to hedge Foreign Repatriation of Dividends exposure with only 5.3% indicating that they transacted currency derivative contracts every week and 7% transacting derivative contracts weekly. This indicates many of the derivative users have large local shareholding, retain much of their profit for reinvestment or have not been paying dividends. A majority of 71.9% never engage in transaction of currency derivative contracts to hedge contractual requirements indicating that a majority of the firms engage in contracts in the local currency. 50.9% never engaged in currency derivative to hedge anticipated transactions of less than one year indicating that majority of the firms do not use currency hedge for short-term currency variations. 64.9% of the firms engaged in currency derivative hedging monthly to hedge transactions of more than one year. This result shows that firms engage in currency transactions to hedge long-term exposures. A majority of (75.4%) never transact currency hedging to mitigate competitive economic exposure indicating that much of the income to derivative using firms is obtained in the local currency. 80.7% of the firms transacted currency derivatives monthly to translate foreign accounting statements indicating that a majority of the firms have branches and associated firms in foreign countries or have a requirement to report to shareholders in foreign countries.

Table 4.9: How often companies transact currency derivative contracts to hedge exposures

Exposure	Daily	Weekly	Monthly	Never
	Row N	Row N	Row N	Row N
	%	%	%	%
Foreign Repatriation of Dividends, Royalties, Interest Payments	0.0%	5.3%	7.0%	87.7%
Contractual Commitments	0.0%	3.5%	24.6%	71.9%
Anticipated transactions of one year or less	0.0%	19.3%	29.8%	50.9%
Anticipated transactions of one year or more	12.3%	10.5%	64.9%	12.3%
Competitive economic exposure	0.0%	12.3%	12.3%	75.4%
Translation of foreign accounting statements	1.8%	15.8%	80.7%	1.8%

4.4.1.4 Interest Rates Derivatives

The study sought to gauge how often companies transacted interest rate derivative contracts to hedge specific debt related exposures. As summarized in Table 4.10, 59.6% indicated that they never engage in transactions to swap outstanding fixed rate to floating rate. This indicates that majority of the derivative users prefer fixed rate debt to floating rate debt. It also indicates that interest rates have been volatile upwards in the period of the study. 49.1% of the respondents indicated that they engaged in interest rates derivative transactions monthly to swap outstanding floating rate to fixed rate confirming the above results. 56.1% of the respondents indicated that their companies engaged in interest rate derivative transactions monthly to fix in advance the rate (Spread) on new debt. This indicates that firms that use derivatives are active in the debt market and negotiate their rates to cushion themselves from future volatility interest rates. It can also be deduced from this results that hedging with derivatives maybe part of the preferred loan covenants when obtaining debt capital from markets. 49.1% of the respondents

indicated that they engaged in interest rate derivative transactions to reduce costs or lock-in rates based upon market view. This result indicates that the derivative users are active in the management of their derivative portfolio and undertake daily review of their positions to reduce costs by taking advantage of any market changes.

Table 4.10: How often companies transact interest rate derivative contracts to Hedge Exposures

Transaction	Daily	Monthly	Annually	Never
	Row N	Row N	Row N	Row N
	%	%	%	%
Swap Outstanding Fixed Rate to Floating Rate	3.5%	12.3%	24.6%	59.6%
Swap outstanding floating rate	0.0%	49.1%	19.3%	31.6%
Fix in advance the rate (Spread) on new debt	5.3%	56.1%	31.6%	7.0%
Reduce costs or lock-in rates based upon market view	49.1%	35.1%	15.8%	0.0%

4.4.1.5 Commodity Price Derivatives

The study sought to know if the level of commodity derivatives use among companies listed at the Nairobi Securities Exchange. The results on Table 4.11 shows that 33% of the respondents currently use commodity derivatives while a majority of 64.9% does not use commodity derivatives currently but intend to use them in the future. Only 1.8% of the respondents do not use commodity derivatives currently and do not intend to use them in the future.

Table 4.11: Commodity Price Derivatives Use

	Frequency	Percent	Valid Percent
No	1	1.8	1.8
Not currently but intend to use them	37	64.9	64.9
Yes	19	33.3	33.3
Total	57	100.0	100.0

As shown on Table 4.12, the most important reason for not using commodity derivatives given by 52.6% respondents is Lack of knowledge about commodity price derivatives and strategies. For many firms, the exposure to derivatives is too little to justify use of derivatives for hedging.

Table 4.12: Important reason for not using commodity price derivatives

Reason	Frequency	Percent	Valid Percent
Lack of knowledge about commodity price derivatives and strategies	20	52.6	52.6
Equity exposure too small or non-existent to justify hedging	13	35.1	35.1
Concerns about taxes and accounting for commodity price derivatives	5	12.3	12.3
Total	38	100.0	100.0

4.4.1.6 Policies and Procedures

The study sought to find out the sources of derivative contracts for derivative users. Three categories were availed to the respondents to choose from, primary, secondary and tertiary. Results on table 4.13 show that 86% of the respondents indicate that commercial banks are the primary sources of derivative contracts. Investment Banks (88.7%) and Insurance companies (89.1%) are secondary sources of derivative contracts. International exchanges (83.3%) and local exchanges (81.5%) are tertiary sources of derivative

contracts. This indicates that derivative markets are not developed in this Kenya and banks remain the most important players in the supply side of derivative contracts.

Table 4.13: Sources of Derivative Instruments

Source of Contracts	Primary	Secondary	Not a Source
	Row N %	Row N %	Row N %
Commercial Banks	86.0%	14.0%	0.0%
Investment Banks	0.0%	88.7%	11.3%
Insurance Companies	0.0%	89.1%	10.9%
International Exchanges/Brokers	0.0%	18.5%	81.5%
Local Exchanges/ Brokers	0.0%	16.7%	83.3%

The study sought to gauge the methods used by firms to evaluate riskiness of a portfolio to enable the firms to apply the right hedging techniques. Results set out on Table 4.14 indicate that value at risk is the most popular method of evaluating riskiness of a portfolio among the firms listed at the securities exchange. 80.7% of the respondents indicate that Value at risk is the method to gauge riskiness of their portfolios. 71.9% of the respondents indicate that Stress Testing and Scenario Analysis as their preferred method of evaluating the riskiness of their portfolio. A majority of 50.9% indicated that they used other undetermined methods of evaluating the riskiness of a portfolio.

Table 4.14: Methods of evaluating riskiness of Portfolio

Method	No	Yes
	Row N %	Row N %
“Value at Risk”	19.3%	80.7%
Stress Testing and Scenario Analysis	28.1%	71.9%
Option sensitivity measure (The Greeks; gamma, delta, vega)	59.6%	40.4%
Price value of a basis point (value of an 01)	54.4%	45.6%
Duration		
Other Methods	49.1%	50.9%

4.4.1.1 Discussion of Descriptive Results for Derivative Use Among Firms Listed at NSE

The survey was carried out to build a background for the study and enable a fuller understanding of the derivative use by companies listed at the Nairobi Securities Exchange. A total of 29.6% of the firms use derivatives to hedge risks alongside using other hedging alternatives to derivative use. The most important hedging alternatives include borrowing in the same currency as asset risk denomination (64.9%) and engineering flexibility into firms’ operations. This indicates that the definition of hedging is broader than derivative use agrees with Judge (2002).

Results indicate that the most popular determinants of firms’ decision to use derivatives is hedging against financial distress (52.6%) which means companies are concerned about the effects of corporate debt in the capital structure specifically financial distress and bankruptcy. This is in line with extant theories of risk management. In the use of derivative securities firms are concerned with credit risk (35.1% Agree, 15.8% strongly Agree), accounting and reporting treatment (54.4%) as well as evaluation of the risk of the proposed derivative (54.4% strongly agree). The concerns of companies can be

addressed using financial policy that regulates the derivative securities markets that removes counterparty risk and show clear emphasis on strict use of international financial reporting standards on the treatment of derivatives.

Results indicate that the market for currency derivative contracts is not developed enough to enable firms' hedge many of the day to day exposures of their businesses. That is expected because much of the derivative trading is with banks and not at the security exchanges. Results show that firms engage with derivative markets daily on cost reduction and locking in interest rates based on market view. Their engagement with markets otherwise is infrequent. Firms do not use commodity price markets because they have little or no knowledge about commodity price derivatives and strategies. These results are indicative of underdeveloped derivative markets and agree with empirical literature discussed in chapter two.

Results indicate that the primary sources of derivative instruments for firms listed at the Nairobi Securities Exchange are commercial banks. Investment banks and Insurance companies are listed as secondary sources of derivative instruments while International and Local exchanges are considered tertiary sources of derivative use. This means commercial banks are important in the supply side of derivative markets structuring the instruments and dealing with derivative users. Results also indicate that value at risk and stress and scenario testing are the preferred methods of evaluating the riskiness of derivative transactions and portfolios. Firms also use other unspecified methods for evaluating the riskiness of derivative transactions and portfolios.

The survey results indicate the perception of the sampled firms listed in the securities exchange. Limited descriptive results were provided to give background to the regression analysis using secondary data from the annual reports of the sampled firms.

4.4.2 Descriptive Results for Debt

Descriptive statistics results shown on Table 4.15 indicate that Non-Derivative Users (NDU) have higher means and standard deviation for financing cost than Derivative users (DUs). This indicates that firms that do not use derivatives pay higher cost of debt than firms that use derivatives. Debt covenants normally require hedging and firms that do not hedge maybe paying higher cost of debt due to the perceived higher risk involved. NDUs also exhibit lower means and standard deviations for financial distress as measured by Altman Z. Altman Z of 3 and above indicate a firm is safe from bankruptcy. On average firms DUs have higher means and standard deviation for this ration indicating that they manage bankruptcy risk better. Derivative Users have higher means, standard deviation of leverage than Non-Derivative users indicating that debt plays a role in the use of derivatives. This results points to the role of hedging and risk management in increasing debt capacity for firms.

Table 4.15: Group Statistics for Debt

		Percentiles									
Usertype	N	Mean	Median	Mode	Std. Deviation	Minimum	Maximum	25	50	75	
	DU	40	5.279172	1.280968	-2.971009	8.476698	-2.97101	33.88945	0.003378	1.280968	8.189881
FC	NDU	115	46219.427	6.2417856	0	197197.02	-3250.543	1280100	1.5589559	6.2417856	45.333022
	DU	40	0.007778	0.000107	.000014	0.025712	0.000014	0.151254	4.64E-05	0.000107	0.002707
LEV	NDU	115	0.0008756	0.0004237	.000000	0.001612	0	0.012885	8.816E-05	0.0004237	0.0008485
	DU	40	4.74875	2.14	.430000	5.579792	0.43	27.36	1.3125	2.14	6.785
FD	NDU	115	0.0008756	0.0004237	.000000	0.001612	0	0.012885	8.816E-05	0.0004237	0.0008485

4.4.3 Descriptive Results for Firm Value

Groups Statistics results on Table 4.16 shows that firms that use derivatives have higher means and standard deviations across all the proxies. The results indicate derivatives users generally have higher market capitalization meaning larger companies employ derivatives. This is an early indication that size is an important factor in risk management. Results also indicate firms that use derivatives have higher sales than firms that do not. This means Derivative Users generally exhibit higher turnover than non-derivative users. Results also indicate that Derivative Users have higher Tobin Q than non-derivative users. This descriptive results show that firm value has an effect on derivative use among firms listed at the Nairobi Securities Exchange across all the proxies used to measure firm value.

Table 4.16: Group Statistics for Firm Value

								Percentiles		
	N	Mean	Median	Mode	Std. Deviation	Minimum	Maximum	25	50	75
MBV	40	35,508,735.08	21,153,003.00	837329.000000	34,224,715.52	837,329.00	134,131,983.00	8,575,773.25	21,153,003.00	56,644,500.00
	115	10,640,744	2415111	47516.00	26549152	47516	149736697	1445608	2415111	7590872
BVS	40	56,016,346.98	39,628,983.00	1374789.000000	51,222,955.15	1,374,789.00	222,440,715.00	11,988,097.50	39,628,983.00	85,367,169.25
	115	6,289,808	3174907	69528.00	8819776	69528	55522166	1504192	3174907	8189800
TobinQ	40	1,942.41	1,539.43	2.820080	1,980.01	2.82	8,025.52	249.40	1,539.43	2,909.33
	115	1705.987	707.815	42.39a	2393.021	42.39	14880.96	347.1	707.815	2164.14

4.4.4 Descriptive Results for Underinvestment

From the descriptive statistics shown on Table 4.17, Derivative Users have larger means and standard deviation of investment expenditures, dividend payout and debt ratio than Non-Derivative Users. These results indicate that firms that employ derivatives incur more cash on investment projects per year. Derivative users therefore undertake more projects with positive NPVs in any typical year. These findings show that derivative usage among firms listed at the Nairobi Securities Exchange is motivated by the need to take advantage of growth opportunities.

These results indicate that firms that use derivatives have higher Dividend Payout Ratio than firms that do not use derivatives. This indicates derivatives users at the Nairobi Securities Exchange have access to the capital markets and can afford to distribute their dividends to their shareholders. Descriptive results also show that derivatives users have higher Debt ratio than non-derivative users validating the claim that derivative use enhances firms' capacity to access debt capital and alleviate underinvestment.

Table 4.17: Group Statistics for Underinvestment

									Percentiles		
	UseType	N	Mean	Median	Mode	Std. Deviation	Minimum	Maximum	25	50	75
DebtRatio	DU	40	0.821	0.295	0.12	1.90886	0.02	11.36	0.12	0.295	0.615
	NDU	115	0.40643478	0.25	0.28	0.62409962	0	4.14	0.12	0.25	0.4
DivPOR	DU	40	12.5324	0.23842	0	52.5713	-3.241	322.9629	0.10563	0.23842	1.322224
	NDU	115	1.2100159	0.2010652	0	3.33833676	-3.34268	29.82155	0.0523673	0.2010652	0.6792249
InvExp	DU	40	6,660,147	1574683	616868	8922566	160535	26847618	788211	1574683	12096860
	NDU	115	1,128,151.69	170946	82106	3071633.97	-66360	22395958	56635	170946	511076

4.4.5 Descriptive Results for Managerial Ownership

Group Statistics shown on Table 4.18 indicates that Derivative Users have higher mean and standard deviation of director's remuneration (DiRemu) than Non-Derivative Users. This indicates that on average derivative users pay higher remuneration to directors than Non-derivative Users. This indicates that directors whose personal income is tied to the company are more likely to engage in use of derivatives for risk management.

The results also indicate that Derivative users have higher mean and standard deviation of Management Shareholding (MomShare) than Non-Derivative Users. This indicates on average companies that use derivatives have higher ownership by management than companies that do not use derivatives. Companies with high management ownership percentage ownership are likely to engage in derivative use because such companies are more likely to develop elaborate risk management programmes in order to enhance their return. As indicated in previous literature, in case the management wealth is tied in the company. This proposition supports the management utility hypothesis (Jin & Jorion, 2006; Tufano, 1996).

Table 4.18: Group Statistics for Managerial Ownership

								Percentiles		
	N	Mean	Median	Mode	Std. Deviation	Minimum	Maximum	25	50	75
MoShare	40	286,016,320	66900000	9,600,000	411,611,513	9600000	1452000000	29400000	66900000	297825000
	155	140,688,718	44250000	4,500,000	260,005,826	1820000	1452000000	14400000	44250000	121000000
DiRemu	40	107,023.25	80500	1,174.00	149,813.84	1174	877734	27444	80500	113503.75
	155	56,819.303	31995	1	85,788.974	1	877734	18000	31995	80027

4.4.6 Descriptive Analysis for Tax Incentive

Group Statistics shown on Table 4.19 indicates that derivative users have higher mean of the dummy variable indicating differed tax than non-derivative users. This is interpreted with caution because the dummy variable is dichotomous, taking the value of 1 when differed tax is present and 0 when not. On average, derivative users are more likely to have differed tax positions in their balance sheets than non-derivative users although the difference is small and it shows most companies listed at Nairobi Securities Exchange have differed tax on their balance sheet.

Table 4.19: Group Statistics for Tax Incentive

	User_Type	N	Mean	Std. Deviation	Std. Error Mean
Tax Incentive	DU	40	1.00	.000	.000
	NDU	115	.96	.205	.019

4.5 Inferential Analysis

The study used inferential analysis to achieve the specific objectives and test the relevant hypothesis. The study carried out Independent T-Test for comparison of means of hedgers and non-hedgers. The study also applied Pearson correlation coefficient to test correlation between explanatory variables. Finally the study employed Binary Logistic Regression to test the statistical significance of the predictors.

4.5.1 Independent T-Test

Independent T-test was run to analyze the difference in means between hedgers and non-hedgers for the independent variables. Independent T-Test is appropriate where the data being analyzed is parametric, unrelated and small. A t-test finds out if there is a significant difference in average means of one continuous or dichotomous group versus another and finds the significance of that relationship. In this case the data to be collected is mainly ratio in nature and a t-test is found to be a suitable measure.

4.5.1.1 Independent T-Test for debt

Independent T-Test was carried out to test the mean Financing Cost and Financial Distress of Derivative users and Non-users. Results on Table 4.20 of the Independent T-test indicate that Financing Cost ($p=.003$) and Leverage ($p=.000$) exhibit statistically significant difference for test of equality of variances. While Financial Distress ($p=.170$) is insignificant. However on the two tailed test of equality of means only Leverage ($p=.005$) is significant. This preliminary analysis indicates that Leverage maybe a

determinant in firms decision to use derivatives while Financing Cost and Financial Distress are less important in the motivation for derivative usage.

Table 4.20: Independent Samples Test for Debt proxies

Proxy		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper	
Financing Cost	Equal variances assumed	9.042	.003	-1.519	153	.131	-47414.700	31217.189	-109087.076	14257.675
	Equal variances not assumed			-2.581	114.000	.011	-47414.700	18371.7780	-83809.054	-11020.346
Financial Distress	Equal variances assumed	1.904	.170	-.563	153	.574	-2.705	4.803	-12.194	6.785
	Equal variances not assumed			-.918	133.775	.360	-2.705	2.946	-8.530	3.121
Leverage	Equal variances assumed	27.967	.000	2.880	153	.005	6.902	2.397	2.1682	11.637
	Equal variances not assumed			1.697	39.107	.098	6.902	4.068	-1.326	15.130

4.5.1.2 Independent T-Test for Firm Value

Results of Independent T-test are set out on Table 4.21 and show that none of the three proxies for firm value are statistically significant for equality of variances. Two tailed tests for Equality of means shows that Book Value of Sales is significant with $p=0.000$.

Table 4.21: Independent Samples Test for Firm Value Proxies

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
MBV	Equal variances Assumed	.004	.951	.916	153	.361	353.671	385.495	-408.314	1114.848
	Equal variances not assumed			1.047	89.537	.298	353.267	337.380	-317.045	1023.579
BVS	Equal variances Assumed	.884	.349	9.266	153	.000	.979	.10568	.771	1.188
	Equal variances not assumed			8.850	62.908	.000	.979	.111	.758	1.200
Tobin Q	Equal variances assumed	.056	.813	.560	153	.577	235.645	421.157	-596.390	1067.680
	Equal variances not assumed			.613	81.555	.541	235.645	384.256	-528.825	1000.116

4.5.1.3 Independent T-Test for Underinvestment

Independent T-test was run to compare means of Derivative Users and Non-derivative Users. The results of Independent T-Test are set out on Table 4.22 show that Investment Expenditure and Dividend Payout are significant both when equal variances assumed and

when equal variances are not assumed. However, Debt Ratio is significant when equal variances are assumed and insignificant when equal variances are not assumed.

Table 4.22: Independent Samples Test for Underinvestment Proxies

		Levene's Test for Equality of Variances				t-test for Equality of Means				
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Investment Expenditure	Equal variances assumed	2.271	.134	6.420	153	.000	1.22018496	.19006227	.84469978	1.59567014
	Equal variances not assumed			8.277	120.427	.000	1.22018496	.14741332	.92832741	1.51204252
Dividend Payout	Equal variances assumed	.196	.659	2.064	153	.041	1.17102123	.56742834	.05001529	2.29202717
	Equal variances not assumed			2.092	69.754	.040	1.17102123	.55969088	.05468388	2.28735858
Debt Ratio	Equal variances assumed	10.538	.001	2.047	153	.042	.41462117	.20259593	.01437462	.81486773
	Equal variances not assumed			1.349	41.935	.184	.41462117	.30725873	-.20548068	1.03472303

4.5.1.4 Independent T-Test for Managerial Ownership

Results of the Independent T-Test set out on Table 4.23 indicates that, Directors Remuneration is significant both when equal variances are assumed and when equal variances are not assumed. Management Shares shows insignificant results both when equal variances and when variances equal are not assumed. On the basis of this univariate analysis therefore, Directors remuneration is significant and therefore is a determinant of derivative use for companies listed at the Nairobi Securities Exchange.

Table 4.23: Independent Samples Test Managerial Ownership Proxies

		Levene's Test for Equality of Variances		t-test for Equality of Means						
Proxy		F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Directors' Remuneration	Equal variances assumed	2.033	.156	3.356	153	.001	.5362238	.1597777	.2205684	.8518791
	Equal variances not assumed			4.506	132.507	.000	.5362238	.1189950	.3008482	.7715993
Management _Shares	Equal variances assumed	13.714	.000	1.436	153	.153	1.89245696	1.31798705	-.71134550	4.49625941
	Equal variances not assumed			.934	41.548	.356	1.89245696	2.02592609	-2.19734629	5.98226021

4.5.1.5 Independent T-Test for Tax Incentive

Independent T-test was run in order to analyze the difference in means between hedgers and non-hedgers for the categorical independent variable Tax Incentive. Tax incentive is a dummy variable taking the measure of 1 if deferred tax is present in a firm's balance sheet and 0 if not.

Results of the Independent Sample Test (T-Test) on Table 4.24 indicate that Tax Incentive is insignificant when equal variances are not assumed and significant when assumed. It shows the two groups, Non-Derivative and Derivative users have significant

differences in their means. There increases the likelihood that tax incentive will be significant and therefore determine the decision to use derivative by listed companies.

Table 4.24: Independent Samples Test for Tax Incentive Proxies

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Tax Incentive	Equal variances assumed	7.879	.006	1.340	153	.182	.043	.032	-.021	.108
	Equal variances not assumed			2.276	114.000	.025	.043	.019	.006	.081

4.5.2 Correlation Analysis

A Pearson's correlation was run to determine the relationship between independent variables. The results are reported in the following sections.

4.5.2.1 Correlation Analysis for Debt

Correlation test was carried out using Pearson's correlation coefficient on debt proxies in order to infer the existence of correlation among the predictors. Table 4.25 shows results for Pearson Correlations results which indicate that there is no significant correlation between the various proxies. Financing Cost has at best a very small negative correlation with Financial Distress while it has insignificant negative correlation with leverage. Financial Distress and Leverage have insignificant and small negative correlation. The correlations between the proxies are not significant enough to affect the results of the analysis.

Table 4.25: Pearson Correlations Test for Debt

Proxy		Financing_Cost	Financial_Distress	Leverage
Financing Cost	Pearson Correlation	1	-.001	-.038
	Sig. (2-tailed)		.994	.634
	N	155	155	155
Financial Distress	Pearson Correlation	-.001	1	-.042
	Sig. (2-tailed)	.994		.604
	N	155	155	155
Leverage	Pearson Correlation	-.038	-.042	1
	Sig. (2-tailed)	.634	.604	
	N	155	155	155

4.5.2.2 Correlation Analysis for Firm Value

Correlation test was carried out using Pearson's correlation coefficient on proxies of firm value. Pearson correlations coefficients set out on table 4.26 indicate that MBV has significant and positive correlations (0.857) with Tobin Q. BVS has no significant correlations with either MBV or Tobin Q. Tobin Q and MBV therefore move together one direction and measure the same thing.

Table 4.26: Pearson Correlation Test for Firm Value

		MBV	BVS	Tobin Q
MBV	Pearson Correlation	1	0.068	0.857
	Sig. (2-tailed)		0.402	0
	N	155	155	155
BVS	Pearson Correlation	0.068	1	-0.029
	Sig. (2-tailed)	0.402		0.716
	N	155	155	155
Tobin Q	Pearson Correlation	0.857	-0.029	1
	Sig. (2-tailed)	0	0.716	
	N	155	155	155

4.5.2.3 Correlation Analysis for Underinvestment

Pearson correlation Test was carried and the results on Table 4.27 indicate that there were no significant correlations between the predictors in the model. There is a very low positive correlation between investment expenditure and dividend payout ratio (0.306) which is indicated as significant at 2-tailed test. This correlation is too low to have significant effect on the eventual results of the model.

Table 4.27: Pearson Correlation Test for Underinvestment

		Investment Expenditure	Dividend Payout	Debt Ratio
Investment	Pearson Correlation	1	.306	.015
Expenditure	Sig. (2-tailed)		.000	.852
	N	155	155	155
Dividend	Pearson Correlation	.306	1	-.096
Payout	Sig. (2-tailed)	.000		.234
	N	155	155	155
Debt	Pearson Correlation	.015	-.096	1
Ratio	Sig. (2-tailed)	.852	.234	
	N	155	155	155

4.5.2.4 Correlation Analysis for Managerial Ownership

Pearson Correlation Test shown on Table 4.28 indicates that there was no significant correlation between the variables in the model. However a level of negative correlation (-0.243) exists between directors remuneration and management shares. This indicates that that increase in director's remuneration may lead to decrease in management shares. It

can also be interpreted that the higher the percentage of shares held by the management, the lower they pay in director's remuneration. Managers with significant ownership in the firm engage in cost cutting and increase the returns to shareowners. The correlation between the variables is not significant enough to affect the results of the regression model.

Table 4.28: Pearson Correlation Test for Managerial Ownership

Proxy		Directors_Remuneration	Management_Shares
Director_Remuneration	Pearson Correlation	1	-.243**
	Sig. (2-tailed)		.002
	N	155	155
Management_Shares	Pearson Correlation	-.243**	1
	Sig. (2-tailed)	.002	
	N	155	155

** . Correlation is significant at the 0.01 level (2-tailed).

4.5.2.5 Correlation Analysis for Tax Incentive

Tax Incentive was a single dummy variable indicating the presence or not of deferred taxes in a firms balance sheet. Correlation Test does not apply in this case.

4.5.3 Logistic Regression Analysis

Logistic regression analysis was performed to identify statistically significant predictors of derivative relative to Independent Variable. The outcome variable of this study is derivative use which is dichotomous, meaning there are two possible outcomes; either a firm is a derivative user or not. Logistic regression aids in understanding the relationship

between a set of continuous or categorical independent variables and dichotomous dependent variable.

4.5.3.1 Logistic Regression Analysis for Effect of Debt on Derivatives Use

The first objective of this study is to establish if debt in the capital structure determines the use of derivatives among firms listed at the Nairobi Securities Exchange. The related hypothesis (Ho) is: *Debt has no statistically significant effect on derivative use among firms listed at the Nairobi Securities Exchange.* Multiple proxies were used to represent debt in logistic regression the model; financing cost, financial distress and leverage. Financing cost is the interest cover ratio and logarithm of the value is used to normalize the effect of scale. Altman Z Model measures financial distress proxy in the model without modification of the variables in the model. Leverage is measured by the book value of debts scaled by book value of assets. The dependent variable is derivative use, which categorical, meaning either the firm is a derivative user, or not.

Logistic Regression Analysis was carried with categorical dependent variable as Use of Derivatives and the Independent Variables as Financing Cost, Financial Distress and Leverage.

4.3.1.1.1 Baseline Model

A logistic provides better fit to the data if it demonstrates improvement over the baseline also called null model or Intercept Only Model. A baseline model is run without the predictors or dependent variables to gauge if the full model's predictive capacity demonstrates an improvement over the baseline model. The null model's predictions are

purely based on the datasets that occur most in the variables. Table 4.29 shows classification of the dependent variable which shows the basic information that 115 observation are non-derivative users and 40 are derivative users. The baseline model predicts non-derivative usage 74.2% of the time.

Table 4.29: Classification Table^{a,b} of the baseline model

		Observed		Predicted		Percentage Correct
				User_Type		
			NDU	DU		
Step 0	User Type	NDU	115	0		100.0
		DU	40	0		.0
Overall Percentage						74.2

a. Constant is included in the model. b. The cut value is .500

Table 4.30 shows the logistic regression results for the baseline model. The only variable in the equation is the constant, meaning the results of the model are the results that could be obtained by chance or estimation without the dependent variables. This is the constant only model and it shows it is significant ($B = -1.056, P=0.000$).

Table 4.30: Baseline Model Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.056	.184	33.098	1	.000	.348

The Score Test sets out the variables not in the equation in the baseline equation on Table 4.31. It is predicted that at least one of the variables will be significant with a p-value of less than 0.05 in the full model. The baseline model is generated for purpose of comparison with the full model to determine any improvement and contributions of the predictors in the model.

Table 4.31: The Score Test: Variables not in the baseline Equation

			Score	df	Sig.
Step 0	Variables	Financing_Cost	2.302	1	.129
		Financial_Distress	.321	1	.571
		Leverage	7.971	1	.005

4.5.3.1.2 Full Model with Independent Variables

Table 4.32 shows classification results for the full model of the effect of debt on the use of derivatives among firms listed at the Nairobi Securities Exchange. When proxies for debt were entered into the model, it explains 76.8% of the cases compared to 74.2% of the baseline model. This indicates that the full model is improvement over the baseline model.

Table 4.32: Full Model Classification Table^a

		Predicted		
		User_Type		Percentage Correct
Observed		NDU	DU	
User Type	NDU	114	1	99.1
	DU	35	5	12.5
Overall Percentage				76.8

a. The cut value is .500

The Omnibus Test explains whether the variance in a given set of data is statistically significantly greater than the overall unexplained variance. The Omnibus Test applies Chi Square test to determine if the new model better fits the data than the baseline model. Table 4.33 indicates that the omnibus test of the model is highly significant ($p = 0.000$, Chi-Square =19.217). This demonstrates that the full model is an improvement of the baseline model.

The -2Loglikelihood measures how poorly the model performs in predicting the outcome. The reduction in the 2Loglikelihood from 177.017 in the baseline model to of 157.8 in the full model indicates that the model has predictive power given the variables in the equation. Values of Cox and Snell R^2 and Nagelkerke R^2 are not analogous to R^2 . The R^2 values approximately explain the percentage variation in the outcome is of the model analogous to how R^2 explains variations in linear regression analysis. Nagelkerke R^2 of this model explains 17.1% of the outcomes and Cox and Snell explain 11.7% of the model outcomes. However, with the weaknesses pointed out already pseudo R^2 are not as strong in predicting outcomes as R^2 . Hosmer and Lemeshow test is significant ($Chi=27.901, p = 0.000$); this shows the model is a good fit for the data. This test is used with cautions as it is highly dependent on sample size and it may not be reliable in analyzing small samples. It is also worth noting that even Hosmer and Lemeshow, (2000), no longer recommend on its strict reliance.

The predictors in the full model were Financing Cost, Financial Distress and Leverage. The results for the three proxies the influence of debt in the use of derivatives as shown in Table 4.39 indicates that Financing Cost ($B=0.000, Wald=0.446, P=0.54$), Financial Distress ($B=-0.03, Wald=0.101, P=0.751$) and Leverage ($B =0.117, Wald=3.608, P=0.057$) are not statistically significant since the p values are higher than the cutoff of 0.05.

Table 4.33: Logistic Regression results for the influence of Debt in the use of derivatives

Proxy	B	S.E.	Wald	df	Sig.	Exp(B)	95% EXP(B) Lower	C.I.for Upper	
Step 1 ^a	Financing_Cost	.000	.000	.446	1	.504	1.000	.999	1.000
	Financial Distress	-.003	.009	.101	1	.751	.997	.980	1.015
	Leverage	.117	.061	3.608	1	.057	1.124	.996	1.268
	Constant	-1.134	.220	26.574	1	.000	.322		

a. Variable(s) entered on step 1: Financing_Cost, Financial_Distress, Leverage.

Omnibus Test: Model $\chi^2= 19.217$ df=3 $P=0.000$,

-2 Log Likelihood = 157.800,

Cox and Snell =0.117 ,

Nagelkerke R Square =0 .171

Hosmer and Lemeshow Test =27.901 df 8 $P=0.000$

4.5.3.2 Logistics Regression Analysis for Effect of Firm Value on Derivatives Use

The second objective of this study is to establish if firm value has statistically significant effect on derivatives use among firms listed at the Nairobi Securities exchange. The related Hypothesis (Ho) is: *Firm Value has no statistically significant effect on derivative use among firms listed at the Nairobi Securities Exchange.* The proxies for firm value in the Logistic Regression Model are Book Value of Sales, Market to Book Value Ratio and Tobin Q ratio. Book Value of Sales represents the Turnover and logarithm of the value is used to normalize the effect of scale. Market to Book Value ratio measures a comparison of market capitalization and book value of the assets of the firm; it is a good indicator of firm value. Tobin Q normally measures firm value is normally used in literature. For the purpose of the study, Tobin Q ratio and Market to Book Value are definite measures of

firm value while Book Value of Sales is an indirect estimate of firm value. The dependent variable is derivative use, which categorical, meaning either the firm is a derivative user, or not.

Logistic Regression was performed with the categorical dependent variable as Use of Derivatives and the Independent Variables as Book Value of Sales, Market to Book Value Ratio and Tobin Q.

4.5.3.2.1 Baseline Model

A baseline model with constant only (without independent variables) was first run as standard comparison measure that will indicate if addition of predictors actually improves the outcome of the full model.

Table 4.34 shows the classification of the independent variables, which indicates that the null model is effective in correctly classifying the outcomes 74.2% of the cases.

Table 4.34: Classification Table^{a,b} of the Baseline Model

Observed		Predicted			Percentage Correct
		User_Type			
		NDU	DU		
Step 0	User_Type	NDU	115	0	100.0
		DU	40	0	.0
Overall Percentage					74.2

a. Constant is included in the model. b. The cut value is .500

Table 4.35 shows regression results for constant only model. The only variable in the equation is the constant and it is statistically significant ($B = -1.056$, $p = 0.00$ ODDS=0.348). This result is obtained purely by chance estimation and is compared with the outcome of the model with variable.

Table 4.35: The baseline Model Equation

	B	S.E.	Wald	Df	Sig.	Exp(B)
Step 0 Constant	-1.056	.184	33.098	1	.000	.348

Table 4.36 indicates the Score Test results obtained by chance without the independent variables. The model predicts addition of MBV and Tobin Q ratio will add any statistical significance to the model and addition of BVS will be statistically significant in the full model. These results are only predictive of the behavior of the independent variables in the full model.

Table 4.36: The Score Test: Variables not in the Equation

		Score	df	Sig.
Step 0	Variables			
	MBV	.846	1	.358
	BVS	55.713	1	.000
	Tobin Q	.317	1	.574
	Overall Statistics	56.584	3	.000

4.5.3.2.2 Full Model with Independent Variables

In classification of observed and predicted cases the full model with predictors is a significant improvement over the null model. Table 4.37 shows the full model is an

improvement over the baseline model; it classifies the cases correctly 89% of the time compared to 74.2 for the baseline model

Table 4.37: Full Model Classification Table^a

Observed		Predicted			
		User Type			Percentage Correct
		NDU	DU		
Step 1	User_Type	NDU	110	5	95.7
		DU	12	28	70.0
Overall Percentage					89.0

a. The cut value is .500

The Omnibus Test of Model coefficients is statistically significant (Chi = 69.794, p= 0.000) and indicates that the model is good fit for the data provided. The model's overall evaluation is important to continue with the analysis. The test indicates the model with predictors is an improvement over the null model. -2 Log likelihood Test indicates how poorly the model predicts decisions. The omnibus test indicates the -2 Log likelihood of the model has reduced by 69.794. This is a significant reduction that gives assurance as the model's strength in predicting decisions.

Cox Snell R² indicates that the model explains 36.3% of the variations the outcome while Nagelkerke R², which is the preferred pseudo R², explains 53.3% of the variations in the outcome of the model. This test is indicative and may not be definitive. Hosmer and Lemeshow Test is dependent upon the sample size and flags that fact that the sample size

is rather small. The higher the value the better fit of the model. P value of 0.00 may indicate the model is a good fit for the model.

A logistic regression model was estimated using proxies for firm value. The results are reported in Table 4.35. Results indicate that Book Value of Sales (BVS) is statistically significant ($B=3.114$, $Wald = 36.217$ $p=.000$) while Market to Book Value Ratio (MBV) ($B=.000$, $Wald=1.777$ $p=0.182$) and Tobin Q ($B=.000$, $Wald=1.950$ $p=0.163$) are not statistically significant. BVS has the most pronounced influence in the model with a higher contribution to the variations in the dependent variable. The odds ratio (Exp (B)) of BVS indicates for every one point increase in BVS, the odds of derivative use by a firm increases by a factor of 22.5, all other factors being equal. The full model, as depicted in Table 4.38, is $\text{Logit (Derivative Use)} = 3.144 (\text{BVS}) - 22.929$.

Table 4.38: Logistic Regression Results for influence of firm value in the use of derivatives

Proxies	B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B)		
							Lower	Upper	
Step 1 ^a	MBV	.000	.000	1.777	1	.182	1.000	.999	1.000
	BVS	3.114	.517	36.217	1	.000	22.512	8.165	62.070
	Tobin_Q	.000	.000	1.950	1	.163	1.000	1.000	1.001
	Constant	-22.929	3.693	38.541	1	.000	.000		

a. Variable(s) entered on step 1: MBV, BVS, Tobin_Q.

Omnibus Test: Model $\chi^2= 69.794$ df=3 $P=0.000$

-2 Log Likelihood = 107.223,

Cox and Snell =0.363,

Nagelkerke R Square =0.533

Hosmer and Lemeshow Test =30.741 df 8 $P=0.000$

4.5.3.3 Logistic Regression Analysis for Effect of Underinvestment on Derivatives

Use

The third objective of the study is to establish if underinvestment determines use of derivatives among firms listed at Nairobi Securities exchange. The related Hypothesis (Ho) is: *Underinvestment has no statistically significant effect on derivative use among firms listed at the Nairobi Securities Exchange.* Proxies for underinvestment in Logistic Regression Model include investment expenditure measured as the increase in noncurrent assets of the firm in period of one year, Dividend Payout Ratio which measures the availability of internal investment to a firm and Debt ratio representing the availability of

external financing for financing new investment. The dependent variable is derivative use, which is categorical, meaning either the firm is a derivative user, or not.

Logistic Regression Analysis was run with the categorical dependent variable as Use of Derivatives and the Independent Variables; Investment Expenditure, Dividend Payout Ratio and Debt Ratio. The Analysis provides model fitting information and regression results used to make inferences on the data analyzed.

4.5.3.3.1 Baseline Model

Logistic Regression results for the baseline or null model shown on Table 4.39 indicate that the baseline model classifies the cases correctly 74.2% the time. This figure will be compared with the model with independent variables to determine if the full model is an improvement in classification from the baseline model.

Table 4.39: Classification Table^{a,b} of the Baseline Model

Observed		Predicted			
		User Type		Percentage Correct	
		NDU	DU		
Step 0	User Type	NDU	115	0	100.0
		DU	40	0	.0
Overall Percentage					74.2

a. Constant is included in the model.

b. The cut value is .500

The baseline model results on Table 4.40 indicate that the model is significant and predicts that the independent variables will contribute to the outcomes of the model.

Table 4.40: The Baseline Model Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.056	.184	33.098	1	.000	.348

The Score Test predicts the statistical significance of the predictors not entered into the model. Results on Table 4.41 predict that all the three proxies; Investment Expenditure, Dividend Payout ratio and Debt Ratio, will be significant in the full model.

Table 4.41: The Score Test: Variables not in the Equation

			Score	Df	Sig.
		Investment Expenditure	32.893	1	.000
Step 0	Variables	Dividend Payout	4.198	1	.040
		Debt Ratio	4.130	1	.042
		Overall Statistics	36.946	3	.000

4.5.3.3.2 Full Model with Independent Variables

The model classifies the cases correctly 78.7% of the time, which is an improvement from the baseline model 74.2% as shown Table 4.42. This improvement shows that adding the predictors to the model increases the models efficiency in predicting the outcomes of the regression. The predictors; investment expenditure, payout ratio and debt ratio are related to the dependent variable derivative use.

Table 4.42: Full Model Classification Table^a

Observed		Predicted			
		User_Type		Percentage Correct	
Step 1	User_Type	NDU	NDU	DU	
			105	10	91.3
	DU	23	17	42.5	
Overall Percentage					78.7

a. The cut value is .500

The Omnibus Test shown is statistically significant ($\text{Chi} = 55.965$, $P = .000$) indicating that the model exhibits goodness of fit for the data to the model. The model summary shows that three important tests -2loglikelihood, Cox and Snell R^2 and Nagelkerke R^2 . -2loglikelihood test indicates that the model is an improvement from the null model because of the reduction of the -2loglikelihood value (121.053). Although the baseline model does not give the figure for this test, It can be determined ($121.053+55.965=177.018$). This significant reduction amounts to improvement on the predictive capacity of the model. Cox and Snell R^2 indicate that the model explains 30.3% of the variations. Nagelkerke R^2 shows that the model explains 44.5% of the variations. This indicates that the model is applicable to the data and can predict the dependent variable given the predictors or independent variables.

Hosmer and Lemeshow Test ($\text{Chi}=14.391$, $P=0.072$) is not statistically significant which indicates that the model is fit for this data. Used along with the Omnibus Test discussed above which statistically significant, the model exhibits goodness of is fit. Hosmer and Lemeshow Test is affected by the sample size and works best when the sample is neither too large no too small. With the model fitting confirmed by the omnibus test as well as the -2Loglikelihood, the model could be considered fit for the data given.

Logistic regression analysis was estimated using proxies representing underinvestment. The results reported on Table 4.43 indicate that Investment Expenditure is statistically significant ($B=2.019$, $Wald\ 26.891$, $P=0.000$). These values indicate that for every one point increase in Investment Expenditure, the odds of derivative use among firms listed at the Nairobi Securities Exchange increases by a factor of 7.53, all other factors being equal. Payout Ratio ($B=-0.079$, $Wald\ 0.983$, $P=0.321$) and Debt Ratio ($B=-0.408$, $Wald\ 2.796$, $P=0.095$) are statistically not significant with p values above the cutoff point of 0.05. The full model, as depicted in Table 4.49, is $\text{Logit (Derivative Use)} = 2.019 (\text{Investment Expenditure}) - 12.558$.

Table 4.43: Logistic Regression Results for underinvestment as determinant of derivative use

Proxy	B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Investment_Expenditure	2.019	.389	26.891	1	.000	7.530	3.511	16.150
Dividend_Payout	-.079	.080	.983	1	.321	.924	.789	1.081
Debt_Ratio	.408	.244	2.796	1	.095	1.505	.932	2.429
Constant	-12.558	2.166	33.605	1	.000	.000		

a. Variable(s) entered on step 1: Investment_Expenditure, Dividend_Payout, Debt_Ratio.

Omnibus Test: Model $\chi^2 = 55.965$ $df=3$ $P=0.000$,

-2 Log Likelihood = 121.053^a,

Cox and Snell = 0.303,

Nagelkerke R Square = 0.445

Hosmer and Lemeshow Test = 14.391, $df=8$, $P=.072$

4.5.3.4 Regression Analysis for Influence of Managerial Ownership on Derivatives

Use

The fourth objective of the study is to analyze if Managerial Ownership determines use of derivatives among firms listed at Nairobi Securities exchange. The related Hypothesis (Ho) is: *Managerial Ownership has no statistically significant effect on derivative use among firms listed at the Nairobi Securities Exchange.* There are two proxies for Managerial Ownership in the Logistic Regression Model; Directors Remuneration and Percentage Shares. Directors' remuneration is the direct and recurring interest of the directors in the business. Percentage shareholding represents the ownership or stake of the management in the firm. The dependent variable is derivative use, which is categorical, meaning either the firm is a derivative user, or not.

4.5.3.4.1 Baseline Model

As shown on Table 4.44 the baseline model classifies the cases correctly 74.2% of the time. There are no predictors in this model and its sole reason for testing is purely for comparison with the full model that includes managerial ownership proxies.

Table 4.44: Full Model Classification Table^a

Observed			Predicted		
			User Type		Percentage Correct
			NDU	DU	
Step 0	User_Type	NDU	115	0	100.0
		DU	40	0	0
		Overall Percentage			74.2

b. The cut value is .500

Table 4.45 indicates that the constant in the baseline model is significant which predicts that the proxies in the model will contribute to improving the model. This is a constant only result which excludes the predictors. The results are indicative of the contribution of the purely estimated outcome.

Table 4.45: The Baseline Model Equation

		B	S.E.	Wald	Df	Sig.	Exp(B)
Step 0	Constant	-1.056	.184	33.098	1	.000	.348

Results on Table 4.46 further predict that the predictors will be significant once the full model is run. The null model predicts that Director’s remuneration will be significant while management shares will not be significant in the final model with predictors. This model was run for purpose of comparison with the model containing the two predictors.

Table 4.46: The Score Test: Variables not in the Baseline Equation

			Score	df	Sig.
Step 0	Variables	Director_Remuneration	10.628	1	.001
		Management_Shares	2.061	1	.151
		Overall Statistics	15.899	2	.000

4.5.3.4.2 Full Model with Independent Variables

The model with predictors explains 79.4% of the cases as shown in Table 4.47 which is an improvement. This shows 5% improvement in classifying the cases. The predictors in the model therefore contribute to explaining the outcomes of the model.

Table 4.47: Classification Table^a of the Full Model

		Observed	Predicted		Percentage Correct
			User_Type		
			NDU	DU	
Step 1	User_Type	NDU	113	2	98.3
		DU	30	10	25.0
Overall Percentage					79.4

a. The cut value is .500

The Omnibus Test (Chi = 28.164, $P = .000$) is statistically significant and indicates the model exhibit a good fit. The test shows the difference in -2 Log Likelihood between the null model and the model with predictors is 28.164. The model with dependent variables is therefore an improvement over the baseline model. Results show that the -2 Log Likelihood has decreased to 148.853 from 177.017, indicating that the model's predictive ability has improved. Cox and Snell R^2 shows that the model explains 16.6% of the outcomes while Nagelkerke R^2 estimates that 24.4% of the outcomes are explained by the model.

Hosmer and Lemeshow Test (Chi = 8.658, $P = .372$) indicates that the model is a good fit for the data. This model's goodness of fit is remarkable since Hosmer and Lemeshow Test is affected greatly by the sample size. While the sample for the model attains the minimum requirements of 1:10 ratio for predictors and observations, it is not in the higher sample sizes expected to result in non-significant goodness of fit test.

A logistic regression was estimated using proxies for Managerial ownership. The full model is reported on Table 4.45. The predictors in the model are significant and positive. Directors' remuneration (B=2.296, p-value =0.00) and Management shareholding

(B=0.082, p-value =0.034) are statistically significant. Results reveal that, other factors held constant, for every one point increase in Directors' Remuneration, the odds of derivative use by firms listed at the Nairobi Securities Exchange increases by a factor of 9.931. Results also reveal for every one point increase in Management shareholding, the odds of derivative use by firms listed at the Nairobi Securities Exchange increases by a factor of 1.085. The final model, as depicted in Table 4.48, is Logit (Derivative Use) = 2.296 (Director Remuneration) + .082 (Management Shares) -11.881.

Table 4.48: Logistics Regression Results for Managerial Ownership

		B	S.E.	Wald	df	Sig.	Exp(B)	95% EXP(B) Lower	C.I.for Upper
Step	Director Remuneration	2.296	.576	15.894	1	.000	9.931	3.213	30.698
1 ^a	Management Shares	.082	.039	4.505	1	.034	1.085	1.006	1.170
	Constant	-11.881	2.749	18.674	1	.000	.000		

Omnibus Test: Model $\chi^2= 28.164$ df=2 $P=0.000$,

-2 Log Likelihood = 148.853^a,

Cox and Snell =0.166,

Nagelkerke R Square =0.244

Hosmer and Lemeshow Test =8.658, df=8, $P=0.372$

4.5.3.5 Regression Analysis for Influence of Tax Incentive on Derivatives Use

The fifth objective of the study is to analyze the influence of Tax Incentive on the use of derivatives among firms listed at Nairobi Securities Exchange. The related Hypothesis (Ho) is: *Tax Incentive has no statistically significant effect on derivative use among firms listed at the Nairobi Securities Exchange.* The proxy for Tax incentive is one dichotomous dummy variable representing the presence of differed tax in the balance

sheet of the firm. The dummy variable is coded 1 if differed tax is present in the balance sheet and 0 if not. The dependent variable is derivative use, which is categorical, meaning either the firm is a derivative user, or not.

4.5.3.5.1 Baseline Model

With only the intercept as the variable in the equation, the results are set in Table 4.49. Results indicate that the model correctly classifies the outcome at 74.2%. The classification affects the goodness of fit of the model with predictors. Tax incentive is a categorical variable measured by dummy variable coded for presence of Deferred Tax in the balance sheet. Unreported results indicate that there are a total of 155 observations. 150 observations have Differed Tax in their balance sheet while 5 observations do not have differed tax in their balance sheet.

Table 4.49: Baseline Model Classification Table^{a,b}

Observed		Predicted			
		User_Type		Percentage Correct	
		NDU	DU		
Step 0	User_Type	NDU	115	0	100.0
		DU	40	0	.0
Overall Percentage					74.2

a. Constant is included in the model.
b. The cut value is .500

Results set out on Table 4.50 indicate that the constant is significant indication that the predictors once added to the analysis will have contribution to the model.

Table 4.50: Baseline Model Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.056	.184	33.098	1	.000	.348

Table 4.51 shows the Score Test (Score=1.797, P=.180) Baseline model estimates that the predictor Tax Incentive will not be significant in the final model once the independent variable is entered into the model.

Table 4.51: The Score Test: Variables not in the baseline Equation

			Score	df	Sig.
Step 0	Variables	Tax_Incentive	1.797	1	.180
	Overall Statistics		1.797	1	.180

4.5.3.5.2 Full Model with Independent Variables

The results of the Omnibus Test ($\chi^2=3.042$ $P = 0.081$) is not significant which indicates that the explained variance in the set of data is not significantly greater than the unexplained variance, overall. This Test indicates that adding the Tax Incentive variable to the model does not the statistical significance of the model.

-2 Loglikelihood measures how poorly the model predicts the decision to use derivative as a result of Tax Incentive. The smaller the statistic the better the model, therefore the statistic of 173.975 can be considered large and with low predictive capacity. The -2Loglikelihood for the null model was 177.017. Cox & Snell R^2 indicates that the model explains 19% of the variations while Nagelkerke R^2 shows that the model explains 29% of the variations in the outcomes.

Results on Table 4.52 indicate that the model with predictors is an improvement over the null model by 14.8% (89% -74.2%). This means the model has relatively high predictive strength and the model is fit for the data.

Table 4.52: Full Model Classification Table^a

	Observed		Predicted		Percentage Correct
			User_Type		
Step 1	User_Type		NDU	DU	
		NDU	112	3	97.4
		DU	14	26	65.0
	Overall Percentage				89.0

a. The cut value is .500

Table 4.53 shows the logistic regression coefficient, Wald test, and odds ratio for each of the predictor, Tax Incentive. Using the P=0.05 rule, the logistic regression results indicates that Tax Incentive is not significant with a p-value of 0.999. Tax Incentive was coded as a dummy variable that with the value of 1 if differed tax is present in the balance sheet and 0 if not. The regression results indicate with large odds ratio that Tax incentive is not a determinant of derivative use among farms listed at the Nairobi Securities Exchange.

Table 4.53: Logistics Regression Results for effect of Tax Incentive on Derivative Use

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 ^a	Tax_Incentive	20.191	17974.837	.000	1	.999	587445676.754	.000	.
	Constant	-21.203	17974.837	.000	1	.999	.000		

a. Variable(s) entered on step 1: Tax_Incentive.

Omnibus Test: Model $\chi^2 = 3.042$ df=1 P=0.081

-2 Log Likelihood = 173.975,

Cox and Snell =.019,

Nagelkerke R Square =.029

Hosmer and Lemeshow Test =0.000, df=1, P=0.000

4.6 Combined Effects Model for the Determinants of Derivatives use Among Firms Listed at The Nairobi Securities Exchange

4.6.1 Logistic Regression for all Variables

A Stepwise Logistic Regression Analysis was carried out to model the joint causal relationship between the dependent variable and the independent variables. The relationship between the Independent Variable (Derivative use) and the Independent Variables (Firm Value (FV), Debt, Underinvestment (UndInv), Managerial Ownership (MO) and Tax Incentive (TAX) takes the general form as:

$$\hat{\pi}(x) = \frac{e^{-B_0 + B_1 FV + B_2 Debt + B_3 UndInv + B_4 MO + B_4 TAX}}{1 + e^{-B_0 + B_1 FV + B_2 Debt + B_3 UndInv + B_4 MO + B_4 TAX}}$$

The Omnibus Test shown indicates that the Chi-Square Test is significant for the final model indicating that the model is an improvement on the baseline only model which would predict the outcomes of the regression by chance.

The overall model has predictive power is indicated by the -2 Log likelihood, Cox and Snell R^2 and Nagelkerke R^2 . Cox and Snell R^2 shows that 46.7% of the variations are explained by the model while Nagelkerke R^2 indicates that 68.7% of the outcomes are explained by the model. It is noted that the pseudo R^2 are not analogous to R^2 and are used sparingly.

Hosmer and Lemeshow Test indicates the relative goodness of fit of the model. The tests's Chi-square is not significant, indicating the model is fit for the data. The test was increasing in not being significant at more variables are entered into the model.

As shown on Table 4.54 the Final model correctly classifies 88.7% of the cases which shows the model has high predictive capacity as compared to the baseline model. The model correctly classifies 108 NDU (Non-Derivative Users) but misclassifies 9 NDU as DU (Derivative Users). The model therefore correctly classifies 93.9% OF NDU and 77.5%. The model is less efficient in classifying DU cases as it correctly classifies 31 cases but misclassifies 9 cases as NDU.

Table 4.54: Classification Table^a

	Observed		Predicted		Percentage Correct
			UseType		
			NDU	DU	
Step 1	UseType	NDU	110	5	95.7
		DU	9	31	77.5
	Overall Percentage				91.0
Step 2	UseType	NDU	110	5	95.7
		DU	9	31	77.5
	Overall Percentage				91.0
Step 3	UseType	NDU	108	7	93.9
		DU	9	31	77.5
	Overall Percentage				89.7

The logistic Regression results on Table 4.55 indicate that Firm Value ($B= 4.633$, $p = 0.000$), Underinvestment ($B= 1.447$, $p=0.000$) and Managerial Ownership ($B=0.137$, $p=0.028$) are statistically significant. All other variables are statistically insignificant with $p < 0.05$ indicating their influence on the dependent variables, derivative use, is low.

According to the results, for every one point increase in Firm Value, the odds of the firm using derivatives increases by a factor of 102.806, with all other factors being equal. Accordingly, for every one point increase in Underinvestment, the odds of the firm using derivatives increases by a factor of 4.250 and for every one point increase in Management Ownership, the odds of the firm using derivatives increases by a factor of 1.147.

The Final model after running stepwise Logistic Regression Analysis therefore will therefore take the following form:

$$\hat{\pi}(x) = \frac{e^{-(-34.824)+4.633FV +1.447UndInv+0.137MO}}{1 + e^{-(-34.824)+4.633FV +1.447UndInv+0.137MO}}$$

Table 4.55: Logistic Regression Results for the Combined Effects Model (Overall model)

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 ^a	FV	4.762	.867	30.149	1	.000	116.959	21.372	640.064
	Debt	-.021	.019	1.225	1	.268	.979	.943	1.016
	UndInv	1.391	.378	13.532	1	.000	4.020	1.916	8.437
	TAX(1)	-18.106	16888.027	.000	1	.999	.000	0.000	
	MO	.130	.062	4.364	1	.037	1.138	1.008	1.286
	Constant	-35.508	6.365	31.125	1	.000	.000		
Step 2 ^a	FV	4.826	.870	30.785	1	.000	124.716	22.675	685.960
	Debt	-.021	.019	1.243	1	.265	.979	.943	1.016
	UndInv	1.420	.378	14.098	1	.000	4.136	1.971	8.679
	MO	.133	.063	4.485	1	.034	1.142	1.010	1.291
	Constant	-36.008	6.380	31.853	1	.000	.000		
Step 3 ^a	FV	4.633	.822	31.788	1	.000	102.806	20.539	514.579
	UndInv	1.447	.377	14.705	1	.000	4.250	2.029	8.905
	MO	.137	.063	4.824	1	.028	1.147	1.015	1.297
	Constant	-34.824	6.068	32.933	1	.000	.000		

Omnibus Test: Model $\chi^2=97.604$ df=3 $P=0.000$

-2 Log Likelihood = 79.413,

Cox and Snell =0.467,

Nagelkerke R Square =0.686

Hosmer and Lemeshow Test =9.043, df=8, $P=0.339$

Stepwise Logistic Regression Analysis was run to establish the determinants of derivative use among firms listed at the securities exchange. The Independent Variables were Firm Value, Debt, Underinvestment, Managerial Ownership and Tax Incentive. Table 4.56 shows that Debt and Tax Incentive were removed from the equation at step 2 and 3 on the account of being statistically insignificant.

Table 4.56: Variables not in the Equation

			Score	df	Sig.
Step 2 ^a	Variables	TAX(1)	.254	1	.614
	Overall Statistics		.254	1	.614
Step 3 ^b	Variables	Debt	2.355	1	.125
		TAX(1)	.268	1	.605
	Overall Statistics		2.593	2	.274

a. Variable(s) removed on step 2: TAX.
b. Variable(s) removed on step 3: Debt

4.6.2 Logistic Regression for Moderation effects of firm characteristics on determinants of derivative use (Moderated Model)

The last objective of the study is to analyze the moderating effects of firm characteristics on determinants of derivative use. Interaction terms between dependent variables that are statistically significant were included into the model to determine if moderation effect is statistically significant. The results are reported in the following sections.

4.6.2.1 Logistic Regression for Moderation effects of Industry on determinants of derivative use

The moderated logistic regression model takes the following general form:

$$\pi(x) = \frac{e^{-B_0 + B_1 FV + B_2 UndIn + B_3 MO + B_4 (IND * FV) + B_5 (IND * UnderIn) + B_6 (IND * MO)}}{1 + e^{-B_0 + B_1 FV + B_2 UndIn + B_3 MO + B_4 (IND * FV) + B_5 (IND * UnderIn) + B_6 (IND * MO)}}$$

Where:

B_0 = Constant

B_2 - B_6 = Coefficients of predictors

FV = Firm Value

UndIn = Underinvestment

MO=Managerial Ownership

TAX = Tax Incentive

IND*FV = Interaction term between Industry and Firm Value

IND*UnderInv = Interaction term between Industry and Underinvestment

IND*Mo = Interaction term between Industry and Managerial Ownership

A stepwise regression analysis was estimated using predictors and interaction terms in order to determine if Industry has a moderating effect on determinants of derivative use.

The results are reported in the following tables.

The moderated logistic regression model is an improvement of the unmoderated model as indicated on Table 4.57. The moderated Cox and Snell R^2 explains 48.9% of the variations as compared to 46.7% for the unmoderated model. The moderated Nagelkerke R^2 explains 71.8% of the variations compared to 68.6% for the unmoderated model.

Table 4.57: Comparison of Model Summary

Step	-2 Log likelihood	Cox & Snell R^2	Nagelkerke R^2
Moderated Model	72.915 ^a	.489	.718
Unmoderated Model	79.413 ^b	.467	.686

Table 4.58 indicates that the moderated model classifies 91% of cases correctly compared to the unmoderated model which classifies 89.7% of the cases correctly. The moderated model is an improvement in classification over the unmoderated model.

Table 4.58: Classification Table^a for Moderated Model

	Observed		Predicted		Percentage Correct
			UseType	DU	
Step 1	UseType	NDU	111	4	96.5
		DU	10	30	75.0
	Overall Percentage				91.0

a. The cut value is .500

The results of the moderation effects of industry on determinants of derivative are reported in Table 4.59. Results show that, Interaction between Managerial Ownership and Industry {MO by IND ($B=0.677$, $P=.017$)} is statistically significant. Interaction between Firm Value and Industry {FV by IND ($B=-0.146$, $P=0.272$)} and Underinvestment and Industry {UnderInv by IND ($B=-4.365$, $P=0.234$)} are statistically insignificant.

The moderated model as depicted in Table 4.59, is Logit (Derivative Use) = 5.236 (FV) +0.1.476 (UndInv)+ 0.123(MO)+ .677(IND by MO) -38.737.

Thus the fitted model is presented as:

$$\hat{\pi}(x) = \frac{e^{-B_0+B_1FV+B_2UndInv+B_3MO+B_4(IND*MO)}}{1+e^{-B_0+B_1FV+B_2UndInv+B_3MO+B_4(IND*MO)}}$$

Table 4.59: Logistic Regression for Moderation Effect of Industry on determinants of derivative use

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step	FV	5.236	.978	28.663	1	.000	187.885	27.634	1277.457
1 ^a	UndInv	1.476	.399	13.671	1	.000	4.377	2.001	9.573
	MO	.123	.062	3.846	1	.050	1.130	1.000	1.278
	FV by IND	-.146	.133	1.209	1	.272	.864	.665	1.121
	IND by UndInv	-4.365	3.667	1.417	1	.234	.013	.000	16.806
	IND by MO	.677	.282	5.744	1	.017	1.968	1.131	3.422
	Constant	-38.737	7.082	29.922	1	.000	.000		

a. Variable(s) entered on step 1: FV, UndInv, MO, * IND, IND * UndInv, IND * MO
Omnibus Test: Model $\chi^2 = 104.102$ df=6 $P=0.000$

-2 Log Likelihood = 72.915,

Cox and Snell =0.489,

Nagelkerke R Square =0.718

Hosmer and Lemeshow Test =26.397, df=8, $P=0.001$

4.6.2.2 Logistic Regression for Moderation effects of Firm Size on determinants of derivative use

The moderated logistic regression model for moderation effects of firm size on derivative use takes the following form:

$$\pi(x) = \frac{e^{-B_0 + B_1 FV + B_2 UndInv + B_3 MO + B_4 (FiSize * FV) + B_5 (FiSize * UnderIn) + B_6 (FiSize * MO)}}{1 + e^{-B_0 + B_1 FV + B_2 UndInv + B_3 MO + B_4 (FiSize * FV) + B_5 (FiSize * UnderIn) + B_6 (FiSize * MO)}}$$

Where:

B_0 = Constant

B_2 - B_6 = Coefficients of predictors

FV = Firm Value

UndInlv = Underinvestment

MO=Managerial Ownership

TAX = Tax Incentive

FV* FiSize = Interaction term between Industry and Firm Size

FiSize *UnderInv = Interaction term between Firm Size and Underinvestment

FiSize *Mo = Interaction term between Firm Size and Managerial Ownership

As shown on Table 4.60, the moderated model shows higher explanatory capacity than unmoderated model using the pseudo R^2 , Cox and Snell R^2 and Nagelkerke R^2 . Moderated Cox and Snell R^2 indicate that the model explains 49.3% of the variations compared to 46.7% for the Unmoderated model. Moderated Nagelkerke estimates that the model explains 72.5% of the variations compared to 68.6% for the unmoderated model.

Table 4.60: Comparison Model Summary

Model	-2 Log likelihood	Cox & Snell R^2	Nagelkerke R^2
Moderated	71.606 ^a	.493	.725
UnModerated	79.413 ^b	.467	.686

The moderated model shows higher classification accuracy than the unmoderated model. As set on Table 4.61, the moderated model classifies 90.3% of the cases as opposed to the unmoderated model that explains 89.7%. This means the moderated model is an improvement over the unmoderated model.

Table 4.61: Classification Table^a

	Observed		Predicted		Percentage Correct
			NDU	DU	
Step 1	UseType	NDU	108	7	93.9
		DU	8	32	80.0
Overall Percentage					90.3

a. The cut value is .500

Results of the logistic regression are reported on Table 4.62. Results show that all the interaction terms (FV by FiSize, FiSize by MO and FiSize by UndInv) are statistically insignificant. The Interactions between Fire Size and other variables does not contribute significantly to the model.

Table 4.62: Logistic Regression for Moderation Effect of Firm Size on determinants of derivative use

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	FV	4.513	.867	27.118	1	.000	91.198
	MO	.124	.061	4.127	1	.042	1.132
	UndInv	1.637	.437	14.004	1	.000	5.139
	FV by FiSize	-2.647	1244.295	.000	1	.998	.071
	FiSize by MO	.129	2501.499	.000	1	1.000	1.137
	FiSize by UndInv	-1.569	8977.847	.000	1	1.000	.208
	Constant	-33.834	6.427	27.714	1	.000	.000

a. Variable(s) entered on step 1: FV2*FiSize , FiSize*MO , FiSize*UndInv .

Omnibus Test: Model $\chi^2=105.411$ df=6 $P=0.000$

-2 Log Likelihood = 71.606,

Cox and Snell =0.493,

Nagelkerke R Square =0.725

Hosmer and Lemeshow Test =6.207, df=8, $P=0.624$

4.7 Discussion of significant findings

H₀1: Debt in the capital structure does not significantly affect use of derivatives among firms listed at the Nairobi Securities Exchange.

According to the findings, the null hypothesis *H₀: Debt in the capital structure has no effect on the use of derivatives* accepted and the alternative hypothesis, *H₁: Debt in the capital structure has affects firm's use of derivatives* is rejected. Findings indicate that debt is not statistically significant as a determinant of derivative use among firms listed at the Nairobi Securities Exchange. The findings contradict major studies in the area such as Purnanandam (2008) and Dolde (1995) which indicate that debt is statistically significant determinant of derivative use.

H₀2: Firm value does not significantly affect use of derivatives among firms listed at the Nairobi Securities Exchange

The null hypothesis is rejected and alternative hypothesis, *Firm value significantly affects use of derivatives among firms listed at the Nairobi Securities Exchange* is accepted. The findings of the study supports the theory that managers engage in risk management in order to maximize firm value. The findings are consistent with similar empirical studies reviewed in chapter two. The study agrees with the empirical study by Allayannis and Weston (2001) and Pramborg (2004) and disagrees with the Sprcic (2007) who found that derivative use does not enhance firm value. The results are also similar to Jin and Jorion (2006) who concluded that firms may not engage in derivative use in order to maximize firm value. The result also agrees with Tufano (1996), who pointed out firm value firm value maximization affects, the decision to use derivatives for risk management.

H₀ 3: Underinvestment does not significantly affect use of derivatives among firms listed at the Nairobi Securities Exchange

The null hypothesis is rejected and alternative hypothesis, *Underinvestment significantly affects derivatives use among firms listed at the Nairobi Securities Exchange* is accepted. Underinvestment is statistically significant and exhibit p-values lower than the cutoff value of 0.05. The study finds positive relation between underinvestment and derivative use among firms listed at the Nairobi Securities Exchange. The findings are in line with the theory that firms with more growth opportunities but with constrained internal cashflow are likely to engage in derivative use. Findings support Bessembinder (1991) and Gay and Nam (1998). Findings disagree with Chiorean, Donohoe and Sougiannis, (2012) showing strong influence of underinvestment over the decision to employ derivatives.

H₀ 4: Managerial ownership does not significantly affect derivatives use among firms listed at the Nairobi Securities Exchange.

The null hypothesis is rejected and alternative hypothesis, ***H₁ :*** *Managerial ownership significantly affects derivatives use among firms listed at the Nairobi Securities Exchange* is accepted. Managerial Ownership is statistically significant in the model. The findings support managerial utility hypothesis managers engage in risk management when their own wealth and benefits are at stake. In this case therefore management of firms listed at the Nairobi Securities Exchange engage in hedging when there is high directors' remuneration or the management has substantial ownership in the firm. Findings support

Tufano (1996) and Graham & Rogers (2002) that managers are likely to hedge with derivatives if their own benefits are at stake.

H₀ 5: Tax incentive does not significantly affect use of derivatives among firms listed at the Nairobi Securities Exchange.

The null hypothesis fails to be rejected and alternative hypothesis ***H₁:*** *Tax Incentive has significant effect on the use of derivatives among firms listed at Nairobi Securities Exchange*, fails to be accepted.

Results are in line with the empirical literature discussed in Chapter two. According to Graham and Smith (1999), companies that face convex tax function may use derivatives as a hedge against expected tax liabilities. In Kenya, companies' face a constant tax liability, corporate tax is 30% for companies registered in Kenya and 37.5% for foreign firms. This means that Tax Incentive cannot be an incentive for hedging in this case. According to Judge (2002), the benefits from using derivatives to lower tax liabilities are greater when the firm's taxable income is in the progressive zone of the tax code and when the firm enjoys tax incentives like tax loss carry forwards, investment tax credits and foreign tax credits. Kenya is similar to the UK where flat tax rate prevails and there is no tax savings that can be derived by companies through use of any hedging technique such as using derivatives.

H₀ 6: Firm characteristics have no significant moderating effect on the determinants of derivatives use among firms listed at the Nairobi Securities Exchange.

Results indicate the industry shows statistically significant moderation in the model while firm size is not statistically significant. The null hypothesis is rejected and alternative hypothesis, ***H₁***: *Firm characteristics have significant moderating effect on the determinants of derivatives use among firms listed at the Nairobi Securities Exchange*, is accepted.

While previous hint that industry has an effect on derivative use, this study has not come across any empirical analysis on moderation effect of industry on determinants of derivative use. This study contributes this unique perspective to the knowledge in this area.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.3 Introduction

The general objective of the study was to analyze the determinants of derivatives use among firms listed in Nairobi Securities Exchange. The specific objectives of the study were: to establish the extent to which firm value determines firm's derivatives use; to establish the extent to which debt capital determines firm's derivatives use; to analyze the extent to which tax incentive determines firm's derivatives use. to analyze the extent to which underinvestment determines firm's derivatives use. to investigate the extent to which managerial ownership determines firm's derivatives use; to analyze the moderating effect of firm characteristics on the determinants of derivatives usage. The findings of the study and the conclusion were guided by the specific objectives of the study. This chapter discusses the findings of the study, the conclusions and the recommendations of the study for policy and for further research.

5.2 Summary of Findings

The study sought to evaluate the determinants of derivative use among firms listed at the Nairobi Securities Exchange. The study employed both descriptive and exploratory research design. The target population of the study is firms quoted at the Nairobi Securities Exchange. There were 65 firms listed at the Nairobi Securities Exchange at the time of the study. Purposive sampling was applied to arrive at the firms included in the study. Banks and Financial Institutions were excluded from the study because their motives for use of derivative instruments are different from other firms. Banks and

Financial Institution are engaged in the supply side of derivative contracts and are therefore market makers. Investment companies were also excluded because their primary business is investing in other firms. Data for the study was collected from two sources; primary data and secondary data. The objective of collecting Primary data was to provide background baseline and comparable results for the study. Primary data was collected using questionnaires. A total of 62 questionnaires were sent respondents out of which, 57 questionnaires were returned bringing the response rate to 91.9%. A pilot study was carried out and reliability and validity of the questionnaire tested. Extensive Secondary data was collected by hand from the annual reports of the sampled 31 firms for the five years 2008-2012. Secondary data was utilized to address the specific objectives of the study.

Variables were obtained through analysis of appropriate literature. Survey data was analyzed using descriptive statistics and only relevant parts of the data was reported. The secondary data was analyzed using univariate and multivariate. The influence of firm value, debt, underinvestment, tax incentive and managerial ownership on derivative use was tested using univariate analysis and binary logistic regression. The moderating effect of firm size and industry on determinants of derivative use obtained through binary logistics was tested using Process Macro. The results were summarized in appropriate tables, hypothesis tested and discussed. The findings are discussed under each objective in the following sections.

5.2.1 The Effect of Debt on Derivatives use

The first objective of the study was to establish if debt is a determinant of derivative used among firms listed in the Nairobi security exchange. Univariate and Multivariate analysis was used to arrive at the findings including Independent T-test and binary logistic regression. The findings indicate that debt has no influence on the use of derivative by companies listed at the Nairobi Securities Exchange. In the analysis performed Findings revealed that all debt is statistically insignificant determinant of derivative use among firms listed at the Nairobi Securities Exchange. Debt exhibits high p-values above the cut-off level indicating that the proxies do not increase the likelihood of derivative use among sampled firms. The study hypothesized that debt is not a determinant of derivative use. The findings show debt is statistically insignificant as determinants of derivative use among firms listed at the Nairobi Securities Exchange. This means that the study fails to reject the null hypothesis; debt has no influence on derivative use.

5.2.2 The Effect of Firm Value on Derivatives use

The second objective of the study was to determine if firm value is a determinant of derivative use among firms listed at the Nairobi Securities Exchange. Univariate analysis and multivariate analysis using binary Logistic regression was performed to ascertain the effects of Firm Value on firm's derivatives' use. Results reveal that the influence of firm value on the use of derivatives is mixed. Findings indicate that firm value is significant as determinant of derivative use among firms listed at the Nairobi Securities Exchange ($p < .05$ i.e. Sig = .0.000). The study hypothesized that firm value has no effect on firm's use of derivatives. The study fails to reject the alternative hypothesis that firm value

influences use of derivatives and fails to accept the null hypothesis that firm value has no influence on the use of derivatives.

5.2.3 The Effect of Underinvestment on Derivatives use

The third objective of the study was to determine the influence of Underinvestment on Firm's Derivative use. Univariate analysis and multivariate analysis employing binary logistic regression was performed to ascertain the effects of Underinvestment on firms' use of derivatives among firms listed at the Nairobi Securities Exchange. Findings indicate that Underinvestment is a significant determinant of derivative use. The findings showed that Underinvestment is statistically significant determinant of derivative use among firms listed at the Nairobi Securities Exchange ($p < .05$ i.e. Sig = .000). The study hypothesized that Underinvestment has no significant effect on the use of derivatives. The findings indicate that Underinvestment is statistically significant. The study therefore fails to accept the null hypothesis that underinvestment has no effect on the use of derivatives and fails to reject the alternative hypothesis that underinvestment has an effect on the use of derivatives.

5.2.4 The Effect of Managerial Ownership on Derivatives use

The fourth objective of the study was to establish if Managerial Ownership has influence on firm's derivative use. Univariate Analysis and multivariate analysis applying binary logistic regression was employed to ascertain the effects of Managerial Ownership on the use of derivatives. The study findings revealed that the impact of Managerial Ownership on derivative use among firms listed at the Nairobi Securities Exchange is statistically significant ($p < .05$ i.e. Sig = .000). The study hypothesized that managerial ownership

has no effect on the use of derivatives while the findings of the however indicate that Managerial Ownership is statistically significant as determinant of derivative use. The study fails to accept the null hypothesis that managerial ownership in the firm has no effect on the use of derivatives and fails to reject alternative hypothesis that managerial ownership in the firm has an effect on the use of derivatives.

5.2.5 The Effect of Tax Incentive on Derivatives use

The fifth objective of the study was to analyze the influence of Tax Incentive on the use of derivatives among firms listed at Nairobi Securities Exchange. The study sought to find out the effects of Tax Incentive on the likelihood that companies use derivatives using univariate and multivariate analysis using binary logistic regression. Dummy Variable with coding of 1 where deferred tax is present in firm's balance sheet and 0 where differed tax is not present is used as proxy for Tax Incentive. Findings showed that Tax Incentive is statistically insignificant determinant of derivative use among firms listed at the Nairobi Securities Exchange ($p > .05$ i.e. Sig = .999). The study hypothesized that tax incentive has no effect on the use of derivatives. Findings indicate that tax incentive is statistically insignificant as a determinant of derivative use. The study fails to reject the null hypothesis that firm's tax incentive has no effect on the use of derivatives and fails to accept the alternative hypothesis that tax incentive has an effect on use of derivatives.

5.2.6 Moderating Effect of Firms' Characteristics on the Determinants of Derivatives Use

The sixth objective of the study was to determine the moderating effects of firms' characteristics on the determinants of derivative use. The moderating effects of Industry and Firm Size were tested on determinants of derivative use derived from the analysis of objective one to five above. From the analysis, the final equation containing three variables Firm Value, Underinvestment and Managerial Shareholding was subjected to moderation Analysis by inserting interaction term in the equation and comparing the unmoderated equation with the moderated equation. Findings indicate that industry has significant moderating effect of firm characteristics on determinants of Derivative Use among firms listed at the Nairobi Securities Exchange. Results also indicate that Firm Size has no significant moderating effect on determinants of derivative use among firms listed the Nairobi Securities Exchange.

The study hypothesized that firm characteristics have no moderating effect on the determinants of derivatives use. Findings indicate that Industry interacts with Independent variables to predict firm's derivative use among firms listed at the Nairobi Securities Exchange. The Findings also indicate that interaction between Firm Size and determinants of derivative use does not predict derivative use. The study fails to accept the null hypothesis that firm characteristics have no moderating effects on the determinants of derivative use and fails to reject the alternative hypothesis that that firm characteristics have moderating effects on the determinants of derivative use.

5.3 Conclusions

This a study based on the determinants of derivative use among firms listed at the Nairobi Securities Exchange. The study looked into the effect of debt, firm value, underinvestment, tax incentive and managerial ownership on firms' derivative use. The study also inquired into the moderating effects of firm characteristics on determinants of derivative use. The conclusions were arrived at based on the findings of the study. The conclusions are presented as per the objectives of the study.

5.3.1 Debt and Derivative use

This study analyzed the effects of debt on derivative use among firms listed at the Nairobi securities exchange. From the findings, debt is not a determinant of firm's decision to use derivatives since the study results indicates that debt is statistically insignificant. The study concludes that presence of debt in the capital structure does not motivate firms listed at the Nairobi Securities Exchange to use derivatives.

5.3.2 Firm Value and Derivative use

The second specific objective of the study was to find out extent to which firm value determines firm's derivatives use. From the findings, the study concludes that firm value determines firm's derivatives use among firms listed at the Nairobi Securities Exchange. This suggests that firms use derivatives to enhance firm value which in line with the firm value maximization objective of the firm.

5.3.3 Underinvestment and Derivative use

In the fourth specific objective, the study sought to find out extent to which underinvestment determines firm's decision to use derivatives. From the findings, the

study concludes underinvestment is a determinant of derivative use among firms listed at the Nairobi Securities exchange. This indicates firms with high growth opportunities and restricted access to capital from the capital are more likely to use derivatives than firms with low growth opportunities.

5.3.4 Managerial Ownership and Derivative use

The fourth objective of the study is to analyze the effect managerial ownership on firm's derivative use. From the findings, the study concludes that Managerial Ownership influences derivatives use among firms listed at the Nairobi Securities Exchange. Firms that pay high directors remunerations are more likely to use derivatives than that pay lower directors remuneration. Firms with high percentage of management ownership are more likely to use derivatives as tools of financial risk management. The study concludes that management utility is an important determinant of derivative use among firms listed at the Securities Exchange. This conclusion supports the agency conflict where management's interest conflicts with shareholder interest.

5.3.5 Tax Incentive and Derivative use

The fifth specific objective of the study is to analyze the influence of tax incentive firm's use of derivatives. From the findings, the study concludes that Tax Incentive has no influence on firm's derivative use. The proxy for tax incentive, Dummy Variable indicating the presence of deferred tax in a firm's balance sheet, is statistically insignificant. The study concludes that the motive for employing derivative for purpose of tax reduction by Kenya firms is not strong because Kenya's tax regime lacks progressivity. In Kenya firms pay flat rate of tax on their net income, however firms

enjoy tax loss carry forwards and investment tax allowances depending on the type of investments undertaken.

5.3.6 Moderating Effects of firm's Characteristics on Determinants of Derivative use

The six objective of the study sought to find out moderating effect of firm characteristics on the determinants of derivatives usage. Two firm characteristics were considered in the analysis; Industry and Firm Size. The study sought to analyze whether belonging to specific industry group has a moderating effect on determinants of derivative use. From the findings the study concluded that Industry has strong moderating effect on determinants of derivative use among firms listed at the Nairobi Securities Exchange

The study also sought to analyze whether belonging to specific firm size group has a moderating effect on determinants of derivative use. From the findings, the study concludes that Firm Size has no moderating effects on determinants of derivative use. The size of the firm does not enhance or reduce the firms' propensity to employ derivatives in risk management.

5.4 Recommendations

The Kenyan capital markets are in the process of introducing derivative securities trading framework. This study sought to understand the determinants of derivative use among firms listed at the Nairobi Securities Exchange. The findings and conclusions of the study lead to policy recommendations for firms and regulators.

5.4.1 Debt and Derivative Use

Since the findings indicated that Debt is not a determinant of derivative use among firms listed at the Nairobi Securities Exchange, the implication of this conclusion for policy is introduction of derivatives may not lead to better management of financial risks resulting from debt by Kenyan firms. Capital market regulator needs to be aware that there is no empirical evidence to support that use of derivatives ameliorates the risk factors associated with debt in the capital structure of firms. This study therefore recommends that before any firm that undertakes hedging with derivatives to manage, to first consider their finance cost and other elements of debt capital. Failure to do this may result in fatal losses to the firms involved.

5.4.2 Firm Value and Derivative Use

There are policy implications from the study's conclusion that firm value is significant determinant of derivative use. The value of the Firm value therefore affects the decision of the firms listed at the Nairobi Securities Exchange to use derivatives. Firms with high turnover and hence higher value are more likely to use derivatives than firms with low turnover. The policy implication for this finding is that firms engage in derivative use once they attain a certain level of value. The study therefore recommends that capital the market regulator require disclosure of value and type of derivatives used for firms with high value in order to enable it understand the risk management practices of firms listed at the Nairobi Securities Exchange. Such disclosure will help investors understand the hidden liabilities associated with holding long or short positions of specific type of derivatives.

5.4.3 Underinvestment and Derivative Use

The policy implication of the finding that that underinvestment is factor determining firm's use of derivative among firms listed at the Nairobi Securities Exchange, is that firms that have growth potential but with limited external funding are likely to use derivatives. This study therefore recommends that investors evaluate the risk management practices of their firms and specifically the use of derivatives in order to evaluate the potential growth opportunities being passed over due to the lack of external funding. Investors should also understand the motives for use derivatives by management specifically where large potentially high yielding projects are being implemented.

5.4.4 Managerial Ownership and Derivative Use

The policy implications for the study's findings that Managerial Ownership contributes to the probability that a company will use derivative, are that management engages in risk management not necessarily for the interest of the shareholders but for their own interest. Where management has stake in a firm, the firm is likely to use derivatives as risk management tool. This confirms the agency theory where shareholders and management interest collide, creating agency costs. This study therefore recommends that management of firms be allocated shares in the firms they so as to tie some of their wealth with the firm as this will make them engage in risk management that maybe beneficial to the shareholders.

5.4.5 Tax Incentive and Derivative Use

Tax planning using derivatives has policy implications for firms and for the public tax authorities. Since the study's findings indicate that Tax Incentive play little or no role in

determining firms' decision to hedge with derivatives, tax avoidance schemes using derivatives cannot work in a tax regime like the one Kenyan firms operate in. Kenya's tax regime lacks progressivity as tax incentive proved to work in countries where tax regimes were progressive. The policy recommendations of these findings are that for tax regimes that lack progressivity, derivatives cannot be used as tax avoidance tools. This study recommends to management of companies that use of derivatives as tax planning measure does not yield any significant benefit to the firms.

5.4.6 Moderating Effects of Firm Characteristics on Derivative Use

Since the findings of study reveal that while industry category has statistically significant moderating effect on the determinants of derivative use, Firm Size has no effect moderating effect on the determinants of derivative use, the characteristics of a firm may inform firm policy towards use of derivatives. Belonging to specific industry may enhance the firms' propensity to employ derivatives in risk management. This means managers may act on industry custom and usages as a basis for use of derivatives which may not yield benefits for the firm. The study recommends that managers undertake proper analysis before undertaking risk management actions and do not follow the industry practices.

5.5 Suggestions for Further Research

The study sought to find out the determinants of derivative use among firms listed at Nairobi Securities Exchange. A similar study can be done for large firms not listed at the securities exchange. The present study excluded banks, financial institutions and investment companies; this is a fertile area that can be inquired into for further research.

The study used firms' data in a period between 2008 and 2012. Therefore, similar studies can be carried out between other range of years or durations. This study looks into the whole range of derivatives use by firms sampled, however an important area of research is the use of exchange rate derivatives by Kenyan Firms. As the Kenya capital markets grapple with the introduction of derivative trading platform, further research is necessary in the areas of derivatives modeling as an extension to the ordinary vanilla derivative securities. Further study is necessary into securitization and asset management field so as to inform the markets of the potentials and perils of the developments in this area.

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APPENDICES

Appendix I: Introduction Letter

Date.....
Chief Executive Officer
..... Limited
P.O Box
Nairobi.

Dear Sir,

RE: ACADEMIC RESEARCH PROJECT

I am a PhD student at the University of Jomo Kenyatta and Technology University (JKUAT). I wish to conduct a research entitled “*Determinants of derivative use firms listed at Nairobi Securities Exchange*”. A questionnaire has been designed and will be used to gather relevant information to address the research objectives of the study. The purpose of writing to you is to kindly request you to grant me permission to correct information on this important subject from randomly selected members of staff.

Please note that the study will be conducted as an academic research and the information provided will be treated in strict confidence. The study report will not identify specific respondents. Strict ethical principles will be observed to ensure confidentiality and the study outcomes and reports will not include reference to any individuals.

Your acceptance will be highly appreciated.

Yours Sincerely

Salah Abdi Sheikh

Appendix II: Questionnaire

Introduction

I am a student at Jomo Kenyatta University of Agriculture and Technology pursuing a PhD Degree in Business Administration. My Research Project is on “*Determinants of derivative use firms listed at Nairobi Securities Exchange*”. This questionnaire is aimed at collecting information on the given topic. The information provided will be held confidentially and used for the purpose of enabling the researcher accomplish an academic requirement.

BACKGROUND OF THE RESPONDENT

1. Name of the respondent (optional).....
2. Job title/Position Held.....
3. Firm.....
4. Gender (*Tick as appropriate*)
 - a. Male ()
 - b. Female ()
5. Experience in the Firm
6. Experience in the industry

Section A: Use of Derivatives

A number of statements are given in each question below describing hedging practices in your company. Please indicate your agreement or otherwise with each statement using the 5 point scale. Against each statement are 5 columns based on the Scale below:

1. *Strongly Agree*
2. *Agree*
3. *Neutral*
4. *Disagree*
5. *Strongly Disagree*

1. Hedging strategies used by your company for financial risk management.

	Hedging Strategies	1	2	3	4	5
a.	The company borrows in the same					

	currency as asset risk denomination					
b.	The company engineers flexibility into companies operations					
c.	The company practices diversification of business lines					
d.	The company uses of derivatives (Forwards, futures, options and swaps)					
e.	The company matches operations costs and revenues in the same currency					
f.	The company optimizes use of insurance policy					
g.	The company enters into risk Sharing and joint ventures					

2. If the company does NOT use derivatives for financial risk management please indicate, your agreement or otherwise with the factors that inform your decision NOT to use derivatives for hedging.

		1	2	3	4	5
a.	Insignificant exposure to exchange rates, Interest rates and commodity prices					
b.	Exposures to exchange rates, Interest rates and commodity prices managed by other means					
c.	Difficulty in pricing and valuation of derivatives					
d.	Difficulty about disclosure requirements of derivatives under IFRS					

e.	Concerns of perception of stakeholders: investors, regulators or the public					
f.	Perceived Costs related with use of derivative programs exceed benefits					
g.	Scarce supply of derivative instruments in the financial markets					

3. There are 3 main sources of financial risk; exchange rates, interest rates and commodity prices. For each source of exposure you manage, please your agreement or otherwise with the strategy or instrument your firm uses to manage that exposure.

a. Foreign Exchange

	Instrument / Strategy type	1.	2.	3.	4.	5
a.	Forwards					
b.	Futures					
c.	Options					
d.	Swaps					
e.	Non-derivative strategy					

b. Interest Rates

	Derivatives type	1.	2.	3.	4.	5
a.	Forwards					
b.	Futures					

c.	Options					
d.	Swaps					
e.	Non-derivative strategy					

c. Commodity Prices

	Derivatives type	1.	2.	3.	4.	5.
a.	Forwards					
b.	Futures					
c.	Options					
d.	Swaps					
e.	Non-derivative strategy					

Section B. Determinants of derivative use

A number of statements are given in each question below describing hedging practices in your company. Please indicate your agreement or otherwise with each statement using the 5 point scale. Against each statement are 5 columns based on the Scale below:

1. Strongly Agree

2. Agree

3. Neutral

4. Disagree

5. Strongly Disagree

4. If your company uses derivatives for hedging risk, please indicate your agreement or not with the reasons for hedging with derivatives.

	Reason for use of derivatives	1.	2.	3.	4.	5.

a.	Hedging against Financing Cost					
b.	Hedging against Financial Distress					
c.	Enhancing Market Value of the firm					
d.	Tax Incentive					
e.	Increase access to debt capital for growth					
f.	Increase profitability through derivative trading.					

5. Please indicate your agreement or otherwise with each of the issues listed as concern for your company with respect to hedging with derivatives

	The company hedges with derivatives because it is concerned with:	1	2	3	4	5
a.	Credit Risk					
b.	Accounting and Reporting treatment					
c.	Tax and Legal Issues					
d.	Transaction Fees					
e.	Liquidity Risk					
f.	Lack of knowledge about derivatives within the firm					
g.	Difficult to quantify firm's underlying exposure					

h.	Perception by regulators, investors and public					
i	Pricing and valuing derivatives					
j	Monitoring and evaluating hedge results					
K	Evaluating the risk of proposed derivative transactions					

Section C: Currency Derivatives (For derivative users only)

6. How often does your company transact derivative contracts to hedge either of the following exposures

	Exposure	Daily	Weekly	Monthly	Yearly	Never
a	Foreign Repatriation of Dividends, Royalties, Interest Payments					
b.	Contractual Commitments					
c.	Anticipated transactions of one year or less					
d	Anticipated transactions of one year or more					
e.	Competitive economic exposure					
f.	Translation of foreign accounting statements					

7. How often does your market view of exchange rates cause to take each of the following actions?

	Action	Daily	Weekly	Monthly	Yearly	Never
a.	Alter timing of hedges					
b.	Alter size of hedges					
c.	Actively takes positions					

8. What percentage of your total foreign currency derivatives (by face value of contracts) has the following original maturities?

	Maturities	Percentage
a.	90 days or less	
b.	91-180 days	
c.	To the end of the current fiscal year	
d.	One year to three years	
e.	Beyond three years	

9. For each of the exposures below, indicate the class of derivatives your firm prefers in the management of that exposure.

1. *Strongly Agree*

2. *Agree*

3. *Neutral*

4. *Disagree*

5. *Strongly Disagree*

	Exposure	Forwards	Futures	Options	Swaps
a	Foreign Repatriation of Dividends, Royalties, Interest Payments				
b.	Contractual Commitments				
c.	Anticipated transactions of one year or less				
d	Anticipated transactions of one year or more				
e.	Competitive economic exposure				
f.	Translation of foreign accounting statements				

10. If you prefer forwards/futures contracts to options, please indicate the reason for this preference in the five scales given.

1. *Strongly Agree*
2. *Agree*
3. *Neutral*
4. *Disagree*
5. *Strongly Disagree*

	Reason for ranking currency forwards above currency options	1	2	3	4	5
a.	Forwards are better suited for your exposure					
b.	Currency options are expensive					
c.	The firm lacks necessary knowledge to use currency options					
d.	Currency options are unavailable					
e.	Other (Please specify).....					

Section D: Interest Rate Derivatives

(If your firm does not use interest rate derivatives please go to the next section)

11. How often does your firm transact interest rate derivative contracts to take each of the following actions? (Circle a response for each exposure, choose never if your firm does not have the particular exposure)

	Action	Daily	Monthly	Annually	Never
a.	Swap outstanding Fixed rate to floating rate				
b.	Swap outstanding floating rate				
c.	Fix in advance the rate (Spread) on new debt				

d.	Reduce costs or lock-in rates based upon market view				
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12. How often does your market view of interest rates cause you to take each of the following actions?

	Action	Daily	Monthly	Annually	Never
a.	Alter timing of hedges				
b.	Alter size of hedges				
c.	Actively takes positions				

Section E: Commodity price Derivatives

(Please answer even if your firm does not use derivatives)

13. Is your firm using commodity price derivatives? *(Please circle an appropriate response)*

	Answer
a.	Yes
b.	No
c.	Not currently but intend to use them

14. If you answered “No” in 11 above, indicate your most important reason for not using commodity price derivatives

Reason for not using commodity price	1	2	3	4	5

	derivatives					
1.	Lack of knowledge about commodity price derivatives and strategies					
2.	Equity exposure too small or non-existent to justify hedging					
3.	Concerns about taxes and accounting for commodity price derivatives					
4.	Other (Specify).....					

Section F: Policies and Procedures

(Please answer even if your firm does not use derivatives)

15. Does your firm have a documented policy with respect to derivatives?

a.	Yes
b.	No

(b). How frequently is derivative activity reported to the Board of Directors?

a.	Monthly
b.	Quarterly
c.	Annually
d.	As needed/ No set schedule

16. Is each of the following a primary source of derivatives, a secondary source or not a source at all? (*Circle an appropriate response*)

	Source	Primary	Secondary	Not a Source
a.	Commercial Banks			
b.	Investment Banks			
c.	Insurance Companies			
d.	International Exchanges/Brokers			
e.	Local Exchanges/Brokers			
f.	Other (Please specify)			

17. Has your firm ever experienced a default by counterparty on derivative contract?

a.	Yes
b.	No

18. How frequently do you value your derivative portfolio?

(*Circle the appropriate letter*)

a.	Monthly
b.	Quarterly
c.	Annually
d.	As needed/ No set schedule

e.	Daily
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19. Does your use any of the following methods for evaluating the riskiness of derivative transactions and portfolios? (*Circle as many as apply*)

a.	“Value at Risk”
b.	Stress Testing and Scenario Analysis
c.	Option sensitivity measure (The Greeks; gamma, delta, vega...)
d.	Price value of a basis point (value of an 01) Duration
e.	Other (Please specify)

20. In one sentence please explain your company’s philosophy towards derivatives.....

THE END

Appendix III: Firms Listed at Nairobi Securities Exchange

Agricultural Sector

1. Eaagads Limited
2. Kakuzi Limited
3. Kapchorua Tea Company Limited
4. Limuru Tea Company Limited
5. Rea Vipingo Plantations Limited
6. Sasini Tea And Coffee Limited
7. Williamson Tea Kenya Limited

Automobiles and Accessories

1. Car And General (Kenya) Limited
2. CMC Holdings Limited
3. Marshalls (EA) Limited
4. Sameer Africa Limited

Banking

1. Barclays Bank Of Kenya Limited
2. CFC Stanbic Bank
3. Co-operative Bank Of Kenya
4. Diamond Trust Bank (Kenya) Limited
5. Equity Bank Limited
6. Housing Finance Company Limited
7. Kenya Commercial Bank Limited
8. National Bank Of Kenya Limited
9. NIC Bank Limited
10. Standard Chartered Bank Kenya Limited

Commercial and Services

1. Express Kenya Limited
2. Kenya Airways Limited
3. Longhorn Kenya Limited
4. Nation Media Group Limited
5. Scangroup Limited
6. Standard Group Limited
7. TPS Eastern Africa Limited (Serena Hotels)
8. Uchumi Supermarket Limited

Construction and Allied Sector

1. ARM Cement Limited
2. Bamburi Cement Company Limited
3. Crown Paints Kenya Limited
4. East African Cables Limited
5. East African Portland Cement Company

Energy and Petroleum

1. Kenol Kobil Limited
2. Kenya Electricity Generating Company (Kengen)
3. Kenya Power & Lighting Co. Limited
4. Total Kenya Limited
5. Umeme Limited

Insurance

1. Britam Limited
2. CIC Insurance Limited
3. Jubilee Holdings Limited
4. Kenya Reinsurance Corporation Limited
5. Liberty Kenya Holdings Limited
6. Pan Africa Insurance Company Limited

Investment

1. Centum Investment Company (ICDCI) Limited
2. Olympia Capital Holdings Limited
3. Transcentury Limited
4. Home Afrika
5. Kurwitu

Investment Services

1. Nairobi Securities Exchange

Manufacturing and Allied

1. Boc Kenya Limited
2. British American Tobacco Kenya Limited
3. Carbacid Investments Limited
4. East African Breweries Limited
5. Eveready East Africa Limited

6. Mumias Sugar Company Limited
7. Unga Group Limited

Telecommunication and Technology

1. Accesskenya Group (Taken private by acquisition)
2. Safaricom

Appendix IV: Secondary Data

VS/No.	Year	Name	Type	MBV	BVS	Tobin_Q	FiCost	FinDistress	Leverage	Tax	InvExp	DivPayout	DebtRatio	DirRemu	MomShares	Industry	FiSize
1	1	1	1	179.92018	7.62083	180.52090	3.1378876	.91493	3.33880	1	7.09862	8.50039	.60072	4.35313	4.3499141	5	1
2	1	2	0	543.66219	7.06251	543.97453	2.0409837	.31375	0.57452	1	6.79859	9.29634	.31234	4.36711	.1119015	5	1
3	1	3	0	2.59999	6.19536	2600.32929	45.3330224	2.31693	0.12879	1	5.70849	4.91080	.33485	4.60604	.2701627	7	1
4	1	4	1	851.56111	8.12878	851.60416	1.1450498	13.79289	0.05055	1	5.94345	8.71191	.04304	4.42630	14.9480772	5	1
5	1	5	1	2.82008	6.85760	3.37628	1.6995608	1.25873	151.25401	1	6.01751	.00000	.42655	4.30092	37.5182315	4	1
6	1	6	0	782.01955	6.48098	782.01955	1.2055938	2.41258	2.31742	1	3.18724	.00000	1.81227	4.44730	.8622474	2	1
7	1	7	1	2931.44134	7.78795	2931.57326	33.8894477	3.65322	0.04500	1	7.39218	9.30103	.13191	3.06967	.0300000	7	1
8	1	8	0	6672.70868	7.51172	6672.79515	436.0380939	63.75892	0.00100	1	6.38756	9.80385	.00665	4.92423	.4552500	6	1
9	1	9	0	2865.69426	6.59432	2866.07514	6.2504852	4.48880	0.09182	1	5.17338	8.30643	.26313	4.07900	2.7160494	4	1
10	1	10	1	6690.40555	6.24912	8020.52659	2.8268972	9.48553	1.41502	1	5.47298	5.72016	11.35630	4.40104	.4047619	5	1
11	1	11	0	2309.58600	6.91653	2309.61256	.0707519	6.58025	0.01278	1	5.77641	8.59348	.02951	4.84634	2.5243580	3	1
12	1	12	0	1987.88869	6.66459	1988.41691	2.6754223	1.78838	0.26572	1	6.05639	8.09279	.52821	4.77296	.8833476	4	1
13	1	13	1	2122.56886	7.43881	2122.98045	.0095864	1.56248	0.10303	1	6.76641	9.33801	.21868	5.04922	1.7632832	4	1
14	1	14	0	1806.78192	7.07810	1806.94120	16.2651628	2.42003	0.08816	1	6.29542	8.78675	.15928	4.74484	.5490196	6	1
15	1	15	0	946.61465	6.13240	946.80245	11.1914003	2.50693	0.22276	1	4.86353	7.07918	.21087	4.25049	5.0000000	1	1
16	1	16	0	274.65537	6.16303	274.94125	16.9480080	1.07025	0.97191	1	5.42531	.00000	.26694	4.00958	.2850183	1	1
17	1	17	0	535.88037	6.47674	536.26329	4.9257835	2.78765	0.21222	1	4.92015	7.17398	.11372	4.29396	1.5709427	2	1
18	1	18	1	2217.64436	7.24145	2217.81593	16.6665265	5.11539	0.07762	1	5.97190	9.23045	.17214	5.25338	1.1000000	6	1
19	1	19	0	1012.43432	6.51097	101.56014	831.2695214	.86394	3.12837	1	5.20935	7.12166	.31673	4.66317	20.7812385	3	1
20	1	20	1	383.04060	7.78155	383.62773	.0032953	1.01041	1.53283	1	6.36436	8.90732	.58714	4.94448	.2599566	3	1
21	1	21	0	.20003	6.17730	200.33723	7.5913734	1.30541	1.52173	1	5.00815	4.29226	.30440	3.34537	9.1836735	1	1
22	1	22	0	339.39753	5.75967	339.67882	-31.6782422	.45664	0.82878	1	3.99458	6.99034	.28129	3.88474	3.0163599	1	1
23	1	23	0	3851.33429	4.84216	7702.90847	15234.0000000	5.42492	0.03114	1	3.47712	7.07918	.23990	.00000	12.0000000	1	1
24	1	24	0	152.37393	6.03955	152.63402	-17.8928793	.34040	1.54959	1	4.92412	6.64129	.23612	4.03523	2.7637181	1	1

25	1	25	0	567.44887	5.90470	567.91612	-1.9443157	.35825	0.82342	1	5.71094	.00000	.46725	4.40560	1.4687693	3	1
26	1	26	0	1.56426	6.76243	1564.70854	15.8417277	89.55498	0.00069	0	4.80777	8.18263	.00108	4.76328	.5437500	3	2
27	1	27	0	1990.08337	6.45007	1990.68474	5.0046571	2.77599	0.23008	0	5.68101	7.90635	.45788	4.94254	.9825994	3	2
28	1	28	0	.30142	6.37831	301.99421	1.7570877	1.63182	0.97370	1	4.95061	4.48919	.29349	4.39030	2.7394951	4	3
29	1	29	0	1324.89787	5.58784	1325.02317	1.0000000	2.17202	0.09457	1	4.83671	8.05411	.12530	4.18418	11.4772501	6	3
30	1	30	0	38.79970	6.24912	8402.27784	.5906238	7.45893	0.01233	1	4.60029	.00000	.10362	4.53272	.3358209	6	4
31	1	31	0	182.18889	6.97547	182.56639	5.3923801	2.93478	0.30432	1	3.16047	.00000	.05544	4.03707	.7132585	6	5
32	2	1	1	156.80350	7.82192	157.42347	4.5742060	1.13118	3.95384	1	7.09845	8.80142	.61998	4.49129	.8113436	5	1
33	2	2	0	311.34283	7.10217	311.72656	6.0242847	.39976	1.23250	1	6.56955	9.04107	.38373	4.26668	.1119015	5	1
34	2	3	0	1.74185	6.31604	174.68712	20.7906261	1.20758	2.88344	1	6.00172	4.79357	.50225	4.72733	2.6540943	7	1
35	2	4	1	725.56674	7.98539	725.59866	3.2989007	12.22385	0.04399	1	5.20557	8.67972	.03192	4.67876	14.9480772	5	1
36	2	5	1	24.84422	6.90856	25.33722	22.8018613	2.26417	14.78583	1	5.76340	7.68656	.36734	4.34094	3.2104429	4	1
37	2	6	0	609.71352	6.51562	609.71352	4.8240829	2.54738	3.17689	1	4.10415	8.14355	1.93699	4.28360	.8622474	2	1
38	2	7	1	2145.85905	7.84806	2145.94253	15.0902733	3.29473	0.03979	1	7.37990	9.60206	.08538	5.05692	.0300000	7	1
39	2	8	0	4754.46420	7.53666	4754.57036	193.5062139	45.17853	0.00142	1	6.31159	9.80385	.00677	4.92776	.4552500	6	1
40	2	9	0	1785.75395	6.44899	1786.10490	6.9149755	2.60893	0.15498	1	5.55583	8.30643	.27676	4.27040	2.7160494	4	1
41	2	10	1	5159.14724	6.21622	6254.09501	.0013638	1.78489	0.63673	1	7.03160	5.32222	3.98728	4.47298	.4047619	5	1
42	2	11	0	3503.65217	6.91327	3503.68475	320.9126984	24.81196	0.00531	1	5.70783	8.89451	.01859	4.80821	1.2621790	3	1
43	2	12	0	1251.24540	6.71137	1251.77553	12.4024629	1.09194	0.42368	1	6.34556	8.17197	.53013	5.00876	.8833476	4	1
44	2	13	1	1763.25507	7.47703	1763.60295	.6854286	1.49294	0.10998	1	6.28149	9.60125	.19392	5.07918	1.7632832	4	1
45	2	14	0	669.32179	7.07158	669.58980	6.2417855	1.42319	0.40043	1	6.50149	8.78675	.26801	4.77811	.5490196	6	1
46	2	15	0	559.81817	6.13707	559.99824	12.4096232	2.22633	0.32142	1	4.66453	7.47712	.17994	4.27651	5.0000000	1	1
47	2	16	0	181.76249	6.33887	182.03394	10.6033860	.76868	1.39813	1	4.91728	7.96010	.25413	4.00130	.2850183	1	1
48	2	17	0	355.88703	6.63844	356.29016	1.8582270	2.90558	0.28412	1	4.69405	7.17398	.10111	4.35185	1.5709427	2	1
49	2	18	1	2861.95213	7.27230	2862.20094	18.7872611	6.77129	0.03364	1	6.19806	9.16879	.09628	5.94336	1.1000000	6	1
50	2	19	0	792.90708	6.61041	79.61421	4.0837319	1.09359	4.08020	1	5.73810	7.12166	.32352	4.71975	20.7812385	3	1

51	2	20	1	168.03188	7.85630	168.71531	-.0004720	1.34505	4.06728	1	6.61500	8.66428	.68343	4.92942	.2599566	3	1
52	2	21	0	2.52967	6.30280	2522.99880	28.7007652	17.44415	0.91886	1	4.30520	4.69020	2.32441	2.94939	9.1836735	1	1
53	2	22	0	276.74657	5.87103	277.02951	18.9718471	1.35596	1.02237	1	4.05694	7.40531	.28294	3.89376	3.0163599	1	1
54	2	23	0	5409.71976	4.96109	5409.89259	1.0000000	5.91911	0.03195	1	3.77815	6.95424	.17283	.00000	12.0000000	1	1
55	2	24	0	220.85517	6.17318	221.04255	7.9704415	1.33448	0.84846	1	5.05782	7.54438	.18739	.00000	2.7637181	1	1
56	2	25	0	355.20013	5.95082	355.68609	.3268178	.74442	1.36811	1	5.23286	.00000	.48595	4.38727	1.4687693	3	1
57	2	26	0	1.43081	6.77232	1431.20806	438.8927790	31.41458	0.00206	1	5.65875	8.04275	.00295	4.83312	.5437500	3	2
58	2	27	0	12932.88947	6.44214	12929.37576	4.4198138	20.23493	0.32020	1	5.62828	7.56393	4.14107	4.94425	.9825994	3	2
59	2	28	0	.31918	6.40546	319.72658	2.9005477	2.58603	0.89735	1	5.07251	4.93634	.28641	4.55627	2.7394951	4	3
60	2	29	0	2672.07548	5.74261	2672.18407	1.0000000	3.38251	0.04064	1	4.57935	8.70732	.10859	4.21848	3.8257500	6	3
61	2	30	0	34.48800	6.21622	5843.20596	1.5589559	6.78575	0.01283	1	4.43987	.00000	.07497	4.50508	.3358209	6	4
62	2	31	0	1338.66485	7.06609	1334.10135	5.3177591	23.60544	0.44136	1	4.49574	.00000	.59084	4.15954	.5943969	6	6
63	3	1	1	22.33522	7.86431	22.99720	5.3790901	1.09767	29.63817	1	7.13334	8.80142	.66197	4.60494	.8113436	5	1
64	3	2	0	261.78794	7.04133	262.29676	3.2552695	.37916	1.94366	1	7.20496	9.04107	.50883	4.35050	.1119015	5	1
65	3	3	0	.97729	6.23266	98.35249	-.0584948	.48722	6.37656	1	5.72473	.00000	.62318	4.81317	2.6540943	7	1
66	3	4	1	1280.51589	8.00711	1280.54063	2.4146908	13.47986	0.01932	1	5.95212	8.88384	.02474	4.83225	1.4948077	5	1
67	3	5	1	5.96533	6.97353	5965.85907	-2.6708555	1.74941	0.06266	1	5.79019	.00000	.37381	4.36065	.1336897	4	1
68	3	6	0	988.51294	6.52438	988.51294	1.1413498	2.42296	2.09949	1	4.75309	.00000	2.07538	4.26902	.8622474	2	1
69	3	7	1	3157.85521	7.92408	3157.96559	8.5884836	3.66333	0.03606	1	7.27817	9.90309	.11388	5.51061	.0300000	7	1
70	3	8	0	5394.20701	7.58748	5394.30966	66.0209965	294.36433	0.00021	1	6.50996	9.84006	.00111	4.66399	.4552500	6	1
71	3	9	0	1054.99757	6.55683	1055.40881	3.9059031	1.80594	0.26523	1	5.25036	8.30643	.27982	4.48202	2.7160494	4	1
72	3	10	1	4195.74871	6.21355	5085.71159	1.4168860	7.83856	0.60836	1	5.60938	5.34341	3.09822	4.65307	.4047619	5	1
73	3	11	0	4839.23231	6.98238	4839.24373	1674.4705882	4.23407	0.08281	1	5.65398	9.09932	.40075	4.91381	1.1456316	3	1
74	3	12	0	1356.97469	6.77559	1357.93767	4.9177345	.95230	0.46514	1	6.56452	8.23891	.63118	5.04124	.8833476	4	1
75	3	13	1	2037.87259	7.44832	2038.22328	.0831209	1.81751	0.06212	1	6.53263	9.48928	.12658	4.25527	1.7632832	4	1
76	3	14	0	1325.56703	7.19362	1325.89014	5.9092632	2.09835	0.20774	1	5.50878	8.78675	.27537	5.13988	.5490196	6	1

77	3	15	0	845.55810	6.15887	845.77939	5.2931588	2.16752	0.09675	1	5.31501	7.68124	.08181	4.27651	5.0000000	1	1
78	3	16	0	358.90811	6.36134	359.15633	19.2202077	1.01536	0.67621	1	5.14093	8.05701	.24270	3.99878	.2850183	1	1
79	3	17	0	391.02050	6.67937	391.43950	2.5647469	2.71382	0.26361	1	4.94067	7.25100	.10308	4.40014	1.5709427	2	1
80	3	18	1	3848.94570	7.35418	3849.21664	.0202261	4.89448	0.03587	1	5.87985	9.24304	.13805	5.14982	1.1000000	6	1
81	3	19	0	989.01692	6.65129	989.29612	3.2874236	.96254	0.27272	1	6.35306	8.26779	.26973	4.77860	1.4843739	3	1
82	3	20	1	488.62850	7.84968	489.27701	.0001731	1.30158	1.18100	1	6.57252	8.66428	.57707	4.89209	.2599566	3	1
83	3	21	0	.56347	6.32506	563.69454	1338.0048309	1.73431	0.39089	1	4.98742	4.69020	.22026	2.94002	9.1836735	1	1
84	3	22	0	526.25507	6.05312	526.50070	139.2255679	2.15653	0.46674	1	4.08768	7.38828	.24563	4.01051	3.0163599	1	1
85	3	23	0	2447.16503	5.09198	2447.35388	104328.0000000	4.65626	0.07717	1	2.51983	6.95424	.18885	2.80550	12.0000000	1	1
86	3	24	0	441.79294	6.43508	442.02579	133.4731042	1.92158	0.47011	1	4.91438	7.73820	.20769	4.33381	2.7637181	1	1
87	3	25	0	353.24175	5.93273	353.75008	.1260181	1.19337	1.43906	1	5.10074	.00000	.50834	3.73544	1.4687693	3	1
88	3	26	0	1.82228	7.05553	1822.83578	138.6007605	6.78374	0.01310	1	5.51675	8.22044	.02386	4.88628	.5056372	3	2
89	3	27	0	1484.22857	6.49212	1484.69314	4.4711761	2.49241	0.21799	0	5.64408	7.56855	.32354	4.94009	.9721975	3	2
90	3	28	0	.43308	6.48692	433.61859	8.1722907	2.33467	0.57631	1	4.64702	4.96070	.24959	4.65919	2.7394951	4	3
91	3	29	0	3666.91478	5.79245	3667.01982	438041.0000000	3.80073	0.02865	1	5.69090	8.23020	.10504	4.65919	3.8257500	6	4
92	3	30	0	32.34522	6.21355	5043.21073	.2547377	4.61109	0.02050	1	4.73793	.00000	.10335	4.53923	.3358209	6	5
93	3	31	0	183.12276	7.06162	183.45838	20.2931630	3.14550	0.38317	1	4.92681	7.57811	.07017	4.18167	.5943969	6	6
94	4	1	1	251.23797	7.86424	251.91111	15.0776839	.84717	2.67922	1	7.34195	8.89242	.67312	4.64591	.1984276	5	1
95	4	2	0	198.93452	7.15803	199.47091	1.8284410	.26602	2.69634	1	7.35017	9.04107	.53640	4.37190	.1119015	5	1
96	4	3	0	.42389	6.24028	42.93530	1.0326411	.82207	12.88514	1	5.54404	.00000	.54619	4.82441	2.6486112	7	1
97	4	4	1	1111.06850	8.34721	1111.18456	.0392889	17.47541	0.10446	1	6.19633	9.16784	.11606	4.94802	1.4948077	5	1
98	4	5	1	.00711	7.00741	7.68465	-.9392103	.81806	59.56999	1	5.79019	2.93374	.42331	4.17047	69.8893419	4	1
99	4	6	0	544.36530	6.56528	544.36530	1.3242047	2.67758	4.67685	1	4.67158	7.74561	2.54592	4.28836	.8622474	2	1
100	4	7	1	1906.26599	7.97696	1906.41504	9.6244505	2.51272	0.08081	1	7.42891	9.90309	.15404	5.62390	.0300000	7	1
101	4	8	0	4487.46404	7.65220	4487.67736	21.4344200	4.23384	0.02567	1	6.49943	9.84006	.11519	4.79183	.4552500	6	1
102	4	9	0	914.94516	6.69650	915.31172	4.1442418	2.62161	0.24149	1	4.70234	8.10231	.22095	4.44560	2.1728395	4	1

103	4	10	1	2538.74826	6.13825	3037.95632	.0363306	4.27944	0.97517	1	5.59530	5.34341	2.97036	4.94352	.4047619	5	1
104	4	11	0	3499.63409	7.05099	3499.67114	221.2834646	11.35923	0.00741	1	5.63869	9.09932	.02593	4.95182	1.1456316	3	1
105	4	12	0	972.34095	6.91281	972.96826	4.4506592	.83748	0.63853	1	6.61206	8.29691	.62086	5.04919	.8833476	4	1
106	4	13	1	1354.24480	7.55490	1354.52323	.0226364	1.72129	0.09326	1	6.13767	9.55986	.12629	5.19312	1.7632832	4	1
107	4	14	0	547.91445	7.19853	548.18941	8.9551999	1.56369	0.52460	1	6.41704	8.88366	.28743	4.78550	.5490196	6	1
108	4	15	0	474.91178	6.32544	475.12355	27.4403169	2.80294	0.44593	1	5.13522	7.81954	.21178	4.33889	5.0000000	1	1
109	4	16	0	309.51628	6.42584	309.77595	50.0093200	.84820	0.77015	1	3.76035	8.26113	.23837	4.15232	.2850183	1	1
110	4	17	0	217.97422	6.78434	218.42367	2.2926409	2.24661	0.70587	1	5.72317	7.26436	.15386	4.42042	1.0472951	2	1
111	4	18	1	2925.11840	7.45967	2925.35595	25.1492765	6.85882	0.04163	1	5.99707	9.48430	.12177	4.98455	1.1000000	6	1
112	4	19	0	707.81523	6.73767	708.12492	5.2068881	.94803	0.42565	1	5.70239	8.28482	.30128	4.85274	1.4843739	3	1
113	4	20	1	263.35331	7.93367	263.95049	.0036273	1.55105	2.24261	1	6.57944	8.84037	.59060	4.91908	.2599566	3	1
114	4	21	0	.39300	6.37600	393.20407	920093.0000000	1.98440	0.52077	1	4.91104	4.86629	.20466	2.94399	9.1836735	1	1
115	4	22	0	347.10017	6.09574	347.34684	24.0258706	2.02514	0.71066	1	4.42615	7.46746	.24667	3.88053	3.0163599	1	1
116	4	23	0	2164.14094	5.01074	2164.33498	#DIV/0!	3.17709	0.06479	1	2.14613	6.95424	.14021	2.59106	12.0000000	1	1
117	4	24	0	303.05221	6.51652	303.12219	141.1554828	1.79134	0.66307	1	4.91438	8.03923	.20094	4.23905	2.7637181	1	1
118	4	25	0	386.41881	5.65353	386.98425	-3.2362968	-1.73395	1.46329	1	5.61871	.00000	.56544	4.26647	1.4687693	3	1
119	4	26	0	1.39209	7.07054	1393.03772	1280100.0000000	4.65805	0.02855	0	5.27186	8.29962	.03975	4.92338	.4213644	3	2
120	4	27	0	800.61385	6.50173	801.00729	.7579247	1.92381	0.35766	1	5.67160	.00000	.28634	4.94582	.9700298	3	2
121	4	28	0	.21956	6.58586	215.80987	-1.8870219	1.94574	1.32819	1	5.22269	5.11084	.29162	4.86421	2.7394951	4	3
122	4	29	0	1835.10482	5.76049	1835.23876	576092.0000000	2.54863	0.07298	1	5.24960	8.23020	.13393	3.98146	3.8257500	6	4
123	4	30	0	44.14857	6.13825	3360.91122	-1.3375032	3.45301	0.02314	1	4.05293	.00000	.07776	4.45079	.3358209	6	6
124	4	31	0	132.61228	7.12105	132.95630	51.4235658	3.33694	0.45590	1	5.45536	7.75420	.06046	4.19407	.5943969	6	6
125	5	1	1	248.78546	7.98074	249.46106	6.9940712	.91882	2.71562	1	7.42613	8.98933	.67561	4.59774	.1763801	5	1
126	5	2	0	127.61853	7.20409	128.14480	.3516426	.20617	4.12381	1	6.93627	9.12025	.52627	4.73860	.1119015	5	1
127	5	3	0	.42439	6.27890	424.83999	1.4604882	1.07302	1.05906	1	5.59127	4.81565	.44945	4.82254	.2522496	7	1
128	5	4	1	2715.70390	8.28449	2715.82614	-.0451062	27.35877	0.04501	1	6.06573	.00000	.12224	4.82829	1.4948077	5	1

129	5	5	1	20.46281	6.93525	21.11937	-2.9710095	.43121	24.19420	1	5.57112	.00000	.49508	4.12437	16.2307493	4	1
130	5	6	0	496.45829	6.59780	496.45829	8.7744082	3.03365	6.03936	1	4.81777	7.84252	2.99829	4.40540	.8622474	2	1
131	5	7	1	1518.67897	8.02937	1518.81771	4.7505661	2.35022	0.09533	1	7.40962	9.94448	.14477	5.31008	.0300000	7	1
132	5	8	0	5591.98731	7.74447	5592.71579	1.5615718	2.99667	0.11132	1	7.15861	9.84006	.62249	4.87067	.4552500	6	1
133	5	9	0	796.88670	6.63353	797.26172	13.4315799	2.22074	0.26722	1	5.27417	8.40334	.21294	4.54361	2.1728395	4	1
134	5	10	1	2107.05229	6.13824	2516.19456	-.0413587	6.78738	0.29389	1	5.84545	4.62325	.74280	5.00287	.4047619	5	1
135	5	11	0	4675.20782	7.09155	4675.23591	116.8200000	19.12325	0.00393	1	5.78654	9.19623	.01839	5.01199	1.1456316	3	1
136	5	12	0	1077.72407	7.05693	1078.38111	3.7536503	1.03597	0.60480	1	6.44238	8.39382	.65181	5.07182	.1766695	4	1
137	5	13	1	512.09948	7.57393	1560.47314	.0285896	1.63997	0.07694	1	6.13513	9.58105	.12003	5.10380	1.7632832	4	1
138	5	14	0	430.49969	7.19153	430.77441	11.8679544	1.16711	0.63814	1	6.64285	8.88366	.27472	4.92441	.5490196	6	1
139	5	15	0	481.44229	6.41022	481.62943	20.4024323	2.58164	0.38871	1	5.20096	7.81954	.18714	4.35574	5.0000000	1	1
140	5	16	0	299.52049	6.44403	299.76561	-10.9067059	.44828	0.76507	1	4.66469	8.23310	.22916	4.17047	.2850183	1	1
141	5	17	0	236.09771	6.75675	236.46685	1.3545905	2.27568	0.79019	1	.00000	7.26436	.18656	4.44767	1.0472951	2	1
142	5	18	1	5403.44143	7.48435	5403.66348	13.5865538	9.45078	0.01397	1	6.07920	9.51188	.07549	4.98578	1.1000000	6	1
143	5	19	0	518.30442	6.72786	518.59411	1.2030420	.72474	0.54934	0	5.96359	8.28482	.28472	4.89194	1.4843739	3	1
144	5	20	1	119.97049	8.03301	120.54270	.0016003	2.02419	4.76013	1	6.70969	8.57277	.57107	5.00432	.2599566	3	1
145	5	21	0	.41195	6.31034	412.13006	479299.0000000	1.58922	0.44250	1	5.43366	4.86629	.18229	3.05576	9.1836735	1	1
146	5	22	0	314.31034	6.14823	314.55759	19.9240386	1.43106	0.78666	1	4.31216	7.46746	.24726	.00000	3.0163599	1	1
147	5	23	0	1667.28059	5.06450	1667.49789	1163499.0000000	18.82778	0.13034	1	.00000	6.95424	.21731	2.61066	12.0000000	1	1
148	5	24	0	3237.74260	6.55720	3232.00218	-3250.5429764	-64.34407	0.63605	1	5.35193	7.81738	2.05935	4.25727	2.7637181	1	2
149	5	25	0	370.86677	5.36155	371.27331	66.2950115	15.79464	1.09618	1	5.43883	.00000	.40654	4.26834	1.4687693	3	2
150	5	26	0	2.25606	7.11584	2256.49249	265364.0000000	4.90613	0.01835	1	4.98796	8.23267	.04141	4.90324	.4213644	3	2
151	5	27	0	746.01834	6.55845	748.54526	.4700093	2.32938	0.28284	1	5.39241	.00000	.21149	5.02686	.8809403	3	3
152	5	28	0	.44654	6.64669	447.01594	9.3694268	3.09384	0.66345	1	5.04688	5.12575	.29625	4.91034	2.7394951	4	3
153	5	29	0	2280.37104	5.96461	2280.48372	68914.0000000	1.96081	0.04941	1	4.99047	8.30938	.11268	4.09989	3.8257500	6	5
154	5	30	0	48.24956	6.13824	3581.46987	627.3794370	7.80337	0.02560	1	5.02297	.00000	.09166	4.31595	.3358209	6	6

155	5	31	0	14880.95916	7.20349	14881.33684	25.7258993	15.35078	0.00475	1	5.47793	7.75420	.07068	4.24239	.5943969	6	6
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