

**DETERMINANTS OF FINANCIAL RISKS HEDGING  
PRACTICES BY NON-FINANCIAL FIRMS LISTED  
AT NAIROBI SECURITIES EXCHANGE, KENYA**

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**Determinants of Financial Risks Hedging Practices by Non-Financial  
Firms Listed At Nairobi Securities Exchange, Kenya**

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**A Thesis Submitted in Partial Fulfillment for the Degree of Doctor of  
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University of Agriculture and Technology**

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## 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 the memory of my beloved father, Joshua Murungi. It is your shining example that I try to emulate in all that I do.

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## LIST OF ABBREVIATION AND ACRONYMS

<b>AFRIDEX</b>	- Africa Futures and Derivatives Exchange
<b>BM&amp;F</b>	- Brazilian Mercantile & Futures Exchange
<b>CBOE</b>	- Chicago Board of Options Exchange
<b>CBOT</b>	- Chicago Board of Trade
<b>CFOs</b>	- Chief Finance Officers
<b>CMA</b>	- Capital Market Authority
<b>CME</b>	- Chicago Mercantile Exchange
<b>CR</b>	- Current Ratio
<b>DP</b>	- Dividend Payout
<b>EUREX</b>	- European Exchange
<b>EUWAX</b>	- European Warrant Exchange
<b>FASB</b>	- Federal Accounting Standards Board
<b>FD</b>	- Foreign Operations Dummy
<b>FR</b>	- Foreign Revenue Percentage
<b>FX</b>	- Foreign Exchange
<b>GR</b>	- Gearing Ratio
<b>IC</b>	- Interest Coverage
<b>KE</b>	- Capital Expenditure
<b>KOFEX</b>	- Korean Futures Exchange
<b>KQ</b>	- Kenya Airways
<b>LIFFE</b>	- London Financial Futures and Options Exchange

<b>M&amp;M</b>	- Modigliani and Miller
<b>MATIF</b>	- Marché à Terme International de France
<b>MB</b>	- Market-to-Book Value
<b>MFI</b> s	- Microfinance Institutions
<b>MNC</b> s	- Multinational Corporations
<b>NSE</b>	- National Stock Exchange of India
<b>NYMEX</b>	- New York Mercantile Exchange
<b>NYSE</b>	- New York Stock Exchange
<b>OTC</b>	- Over the Counter
<b>PE</b>	- Price/Earnings
<b>R&amp;D</b>	- Research and Development
<b>RMB</b>	- Rand Merchant Bank
<b>SAFEX</b>	- South African Futures Exchange
<b>SPSS</b>	- Statistical Package Social Sciences



## **DEFINITION OF TERMS**

**Derivative:** Derivative is as, a financial instruments whose value depends on or is derived from a secondary source such as an underlying bond, currency or commodity (Lynch & Timothy, 2011).

**Economics of Scale:** It is the cost advantages that an enterprise obtains due to expansion; that is, reductions in unit cost as the size of a company and the usage levels of other inputs increase (Sullivan & Sheffrin, 2003).

**Financial Distress:** Financial distress is a condition of the firm, which leads to a non-trivial probability of incapacity in paying off its financial obligations to its creditors on due date (Hull, 2005).

**Foreign Exposure:** Foreign Exposure refers to the degree to which a company is affected by exchange rate changes or the risk associated with activities that involve a global firm in currencies other than its home currency (Allayannis & Ofek, 2001).

**Hedging:** Hedging is an attempt to reduce the risk of an underlying transaction by concluding an adverse transaction in order to offset the risks (Hausin, Hemmingsson & Johansson, 2008).

**Managerial Risk Aversion:** Managerial risk aversion is the reluctance of a manager to accept a risk with an uncertain payoff rather than one with more certain, but possibly lower, expected payoff (Stulz, 2003).

**Underinvestment Cost:** Underinvestment cost is inadequate financing of firms growth opportunities due to insufficient internally generated cash flows and expensive external financing (Froot, Scharfstein & Stein, 1993).

## ABSTRACT

Non-financial firms have faced myriad financial risk from exchange rate, inflation, to interest rate. Despite these risks which lead to losses and even downright collapse, nonfinancial firms have lagged behind their financial counterparts in financial risk management. The purpose of the study was to investigate the determinants of financial risk hedging practices by non-financial firms listed at the Nairobi Securities Exchange. The study specifically focused on factors such as financial distress, underinvestment, economies of scale, foreign exposure and managerial risk aversion. The study adopted a descriptive survey method targeting non-financial firms listed at the NSE which are 39 by 2011. The study undertook a census of the 39 firms and focused on head of finance. The study collected primary and secondary data using semi-structured questionnaires and from annual reports, respectively. The study conducted reliability and validity test on the questionnaires. Data analysis was done through descriptive and inferential statistics. Specifically, means, frequencies, standard deviation and percentages were the descriptive statistics used. Logit regression modeling was considered as the inferential analysis. The findings show that majority of nonfinancial firms faced myriad risks such as: foreign exchange risks, interest rate risks, and commodity price risks, in order of decreasing prevalence. The most used derivative instruments by nonfinancial firms were forwards and swaps; futures and options were often used. The results also show that, of firms not using derivatives, half was because the exposures was not significant and others was because the cost of establishing and maintaining derivatives programmes exceed the expected benefits. The results show that foreign exchange risk was the risk most commonly hedged using derivatives followed by interest rate risk. Commodity risk was the most rarely hedged risk. The most important reason for using hedging with derivatives was managing the volatility in cash flows. The probability of hedging financial risks using derivatives was significantly higher for firms facing higher financial distress as opposed to those facing low financial distress. Derivative use was greater for firms with increased underinvestment costs. Derivatives use was significantly greater for firms with greater economies of scale and foreign exposure. Besides, management risk aversion culminated into increased hedging using derivatives. The study concluded that financial risk hedging were influenced by financial distress, underinvestment costs, economies of scale and foreign exchange exposure. The study recommends that nonfinancial firms should develop hedging policies that act as blueprint in hedging financial risks and capacity building programs on derivative use. In addition, derivative market in Kenya together with regulatory framework should be developed.



## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Overview**

This chapter reviews the background of the study, statement of the problem, objectives of the study, research hypothesis, justification, significance, and scope of the study. The last section in the chapter covers the limitations of the study. The study explores the determinants of hedging of financial risk in non-financial firms. It, thus, looks at the financial risks the non-financial forms face and several hedging practices adopted globally, regionally and in Kenya.

#### **1.2 Background of the Study**

Financial instruments such as derivatives have been intensively used to hedge financial risks. Derivatives are kinds of financial instruments whose changes in market value are dependent on changes in underlying variables (asset and/or liabilities). Common examples of underlying variables are interest rates, exchange rates, stock prices, stock-market indices, or prices of commodities. Besides hedging risks, derivatives can be used for trading (speculative) purposes. Though the primary users of derivatives are financial institutions such as banks, insurance companies, and investment managers, the usage of derivatives by non-financial firms is considerable (Bartram, Brown & Fehle, 2009).

The use of derivative instruments has become a common practice in the risk management activities of non-financial firms around the world (Bartram, Brown &

Fehle, 2003). In particular, derivatives are widely used to manage foreign exchange rate (FX) and interest rate (IR) risks, while the use of commodity price derivatives is more concentrated in particular industries. While these instruments are only one tool of risk management, the use of derivatives can be interpreted as a proxy for corporate risk management, and various theories have established a case for hedging at the firm level of non-financial firms, based on capital market imperfections such as underinvestment problems, taxes, financial distress (Brigham & Ehrhardt, 2005) or management incentives (Stulz, 2003). Indeed, there is some empirical support for these theories (Geczy, Minton & Schrand, 1997). In contrast, while it can be observed that non-financial firms use a variety of instruments to manage financial risks, it is not clear whether the full potential of these instruments is being realized.

Study by Marek and Yousiph (2006) states that non-financial firms enter into hedging because of a number of benefits such as stabilizing their share value in the market, reducing their tax liability, acquiring funding from financial institutions, promoting growth, research and development. Theoretical arguments on reasons why firm hedge is also undoubtedly elegant; Stulz (2003) and Smith and Stulz (1985) argued that hedging instruments are employed to minimize cash flow variability by reducing financial distress cost, underinvestment problem, agency cost of debt, among others.

Hedging practices vary from company to company, with the decision to hedge being based on the risk attitude of the company's management team. Attitude toward risk can range anywhere from being averse to being a risk-taker. Risk averse companies, seek to

cover every exposure as soon as it arises, while risk takers leave all exposures unhedged with the hope that gains or losses which arise from movements in foreign exchange or interest rates will be offset in the long term (Adams, 2011).

### **1.2.1 Global Outlook of Financial Risk Hedging**

International Swaps and Derivatives Association (ISA) states that hedging of financial risk using derivative financial products, such as forwards, futures, options and swaps, has grown exponentially over the last decades. This is true primarily for over-the-counter (OTC) instruments, but also, though to a much lesser degree, for the smaller market of exchange-traded derivatives (Bartram, 2000). A survey conducted by the ISA (2009), found that 94% of the world's largest companies use derivatives to hedge their risk. Of the 500 companies researched, all corporate and financial institutions in Canada, Switzerland, the Netherlands, Great Britain, France and Japan use derivatives on a frequent basis. In Germany and the USA 97% and 92% of the companies surveyed use derivatives, whereas in emerging markets such as South Korea and China, only 87% and 62%, respectively, use derivatives to manage risk (Ibid).

Research by Rossi (2007) examined the decision of Brazilian firms to hedge and found that the size of the firm and the extent of foreign currency debt; influence hedging decisions. El-Masry (2003) studied the determinants of the derivatives usage in the UK non-financial companies and found that larger firms are more likely to use derivatives than medium and smaller firms, public companies are more likely to use derivatives than private firms and derivatives usage is greatest among international firms. Kapitsinas

(2008) studied derivative instruments usage determinant among Greece non-financial firms. The study found that the firms used derivatives to reduce cash flow variability, minimize variation in accounting earnings and increase firm value.

Study by Purnanandam (2008) empirically tested the relationship between financial distressed firms and corporate risk management activities on 2000 non-financial US firms and found that highly leveraged firms were more likely to hedge financial risk while highly growth oriented firms, with low debt ratio, were less inclined towards the hedging. Fatemi and Glaum (2000) presented a study of risk-management practices in large, non-financial German firms which found that survival is the top goal of risk management. Popov and Stutzmann (2003) examined how two Swiss companies manage their foreign-exchange-rate risk. They found significant differences in foreign-exchange-rate risk-management policies, notably in the choice of type of exposure to cover, and the hedging instruments to be used.

### **1.2.2 Financial Risk Hedging in Africa**

Futures Industry Association (2010) states that the hedging practice in Africa has been very low as derivative markets are not well developed. Some of the derivative markets are South African Futures Exchange, Abuja Commodities Exchange, Global Board of Trade Limited. (GBOT in Mauritius), among others (African Development Bank, 2010).

In South Africa, the ever changing landscape in export and production markets, coupled with a currency whose only constant is change, hedging is increasingly becoming an integral element for all import and export businesses. The hedging strategies in practice



can fall into six broad categories, that is, do nothing and retain the risks and benefits, offset exposures within legal entities, match assets and liabilities in the same currency, transfer the risk to the market by purchasing insurance in the form of a forward exchange contract. Next is the use of other products to eliminate the risk but retain some benefits which is derivatives, and a combination of the aforementioned. However, only some risks such as foreign-currency exposures, may be hedged in terms of the South African Reserve Bank Exchange Control rulings. That is, the list of permissible transactions relates to trade transactions, any translation exposure (balance-sheet hedging) or economic exposure (relating to hedging against competitors in other countries) is not permitted (FIA, 2010).

Hedging took a gigantic step forward with the development of derivative products in global financial markets. The growth in depth and breadth of these markets has made derivatives one of the most important instruments to trade risk in South African financial markets. In fact, a narrower definition of hedging associates it solely with the trade in risk that is carried out using derivatives. Contrary to what is observed in more mature markets, foreign exchange contracts make up more than 80% of over-the-counter (OTC) derivatives market trading in African markets. Financial market deepening and wealth creation are pushing greater financial integration and residents in African Markets are broadening their portfolio holdings of foreign securities. The non-financial corporate sector has a relatively greater share of more complex and long-lived foreign exchange derivatives (Saxena & Villar, 2008).

Hedging of risks in South Africa takes place in both the OTC market and on the established stock exchanges. Trading on warrants, equity futures and options, and the agricultural commodity futures and options takes place on the JSE. Trading on fixed-income derivatives such as bond futures, vanilla swaps and standard bond options takes place on the BESA. Trading on interest rate futures and options takes place on both exchanges. Trading on the currency futures and fixed income derivatives (such as interest rate futures) are mainly concentrated in the OTC market. Exchange-based trading on interest rate futures and options commenced in 2003 on the BESA through Intersec, a fixed income derivative platform. Finally, exchange-based trading on currency futures commenced on the JSE currency futures exchange platform (Yield-X) in 2007 (Adelegan, 2009).

A study by Ramlall (2009) on determinants of hedging by firms in Mauritius from the data on Mauritian firms for the year 2005-06, established that managers' incentives to hedge and tax convexity, motive to hedge, along with financial and operational explanations underlying hedging, are basically not applicable in Mauritius. The size and age of firms are found to be positively related to hedging, endorsing the fact that high fixed costs and knowledge in establishing a derivative framework are important. The study by Abor (2005), established that most Ghanaian firms hedged against foreign exchange risk through over-the-counter foreign exchange forwards and hard currency swap.

### **1.2.3 Financial Risk Hedging in Kenya**

Kenya is heavily dependent on imports and thus a great market for hedging especially foreign exchange derivative providers offering solutions to corporate and institutional clients. With international trade increasing, enterprises are increasingly realizing the need to explore foreign exchange hedging strategies to mitigate currency risk. Hedging against foreign currency exposure is increasingly becoming important because of volatile exchange rates that in one swing, turn profit into loss and vice versa as companies settle financing and purchase obligations incurred in various hard currencies (Mugwe, 2011).

Corporates engage in numerous hedging practices to manage their risk. This includes options and forwards which are widely used to book or determine rates for future pricing. However, hedging activities are still low, making shareholders in Kenyan firms to lose billions of shillings each year due to directors' failure to shop for appropriate hedging instruments or their imprudent choice of hedging. Kenya being a net importer with imports being dollar denominated, foreign exchange fluctuation affects firms' pricing and production cost strategies. Access Kenya Group, for example, reported a Sh50 million knock on its profit in 2010. Besides, foreign exchange hedging contract that Kenol Kobil signed in 2010 to guard itself against volatility of the shilling, it still reported a loss of Ksh1.5billion. Kenya Airways posted a Ksh4 billion loss in 2008 and attributed the loss to fuel hedging losses and depreciation of the Kenyan shilling versus the US dollar (Karp, 2009).

Financial risk management is not helped by the fact that companies in Kenya, issue floating rate corporate bonds which are pegged on the movement of treasury bills. A case in point, a sharp rise in the 182-day Treasury bill rate over 10 month period which hit an average of 14.68% in October 2011, compared to 2.57% in January. As a consequence, companies paid a heavy price as the current surge in interest rates increases their financing costs (Mugwe, 2011).

A study by Nzuki (2010) that surveyed the use of futures contracts as a means to mitigate price volatility by oil companies registered in Kenya, showed that oil companies in Kenya indeed hedged crude oil price volatility using a hybrid of derivatives, mainly futures and forward contracts, and that the hedging impacted positively on their profit margins. However, despite the positive impact, Kenyan companies under-hedge their commodity price risks. That is, they hedge about 31 to 60% of their oil volumes compared to optimal hedge ratio of 93%.

Shilling exchange rate volatility has been erratic with the same being ranked the worst performing currencies in Africa and the world's third-worst performing currency after Suriname's Dollar and Maldives' Rufiyaa after trading at all-time low of 108 Ksh/USD in September from 77 Ksh/USD at the beginning of 2011 (See Appendix IV); about 43% depreciation (Legovini, 2002 ; Turana, 2011). In addition, Kenyan commodities markets experienced highly unstable prices owing to erratic inflation which rose from 5.4% in January to 19.7% in November 2011 (Appendix III) (McGregor & Doya, 2011 ; Mungai, 2011). In reaction to inflationary pressure, CBK increased its base lending rates

from 5% in January to 11% in October and 16.5% in December; effectively increasing banks' lending rates to between 20-25% from 10% (Appendix V) (Okoth, 2011).

### **1.3 Statement of the Problem**

Non-financial firms carry out their activities in an extremely dynamic, and often highly volatile, commercial environment (Okoth, 2011). Exposure to financial risk predisposes financial firms to cashflow problems, losses and even downright firm failure. Karp (2009) states that nonfinancial firms in developing world incur huge losses owing to managements' failure to hedge financial risks.

Kenya Shilling, for instance, moved from 77Ksh/USD to 108 Ksh/USD in just nine months in 2011 (Turana, 2011). Inflation moved from 5.4% to 19.7% and CBK's base lending rate between 5% and 16.5% within the same period (Okoth, 2011; McGregor & Doya, 2011). At firm level, owing to foreign exchange risks, Kenol Kobil made a foreign exchange loss of Sh1.2 billion on its 2011 operations, up 79% from 2010; CMC Holdings made a Sh11.9 million loss; while, Athi River Mining (ARM) made a Sh685 million loss within the same period. Besides, CFC Stanbic, PTA Bank, Shelter Afrique and Safaricom faced a four-fold jump in their corporate bonds' interest costs pegged on movement of the 182-day treasury bills which surged by 4.5% points to 9.94% in 2011 (Michira, 2011).

Hedging through derivative can lower the probability of future financial distress, helps to achieve greater stability of cash flow and business operations (Dum, 2012; Smithson & Simkins, 2011). Despite the importance of hedging, practices such as derivative

instruments are rarely used by companies in Kenya. Nzuki (2010) established that derivatives usage in Kenya oil companies is below the optimal level; 31 to 60% against an optimal of 93%. This begs the question on what determines hedging practices of non-financial firms in Kenya. Few local previous studies have focused on individual firms leading to incomprehensive, non-robust findings. Little attention has been given on the determinants of hedging of financial risks in listed non-financial firms. This study sought to fill the knowledge gap.

## **1.4 Research Objective**

### **1.4.1 General Objective**

The study sought to establish the determinants of hedging of financial risks by non-financial firms listed at the Nairobi Securities Exchange, Kenya.

### **1.4.2 Specific Objectives**

The objectives of the study were to:

- i. Determine influences of financial distress on hedging practices of non-financial firms listed at the NSE
- ii. Establish the influence of underinvestment cost on hedging practices of non-financial firms listed at NSE
- iii. Assess the influence of economies of scale on hedging practices of non-financial firms listed at NSE
- iv. Evaluate the influence of foreign exposure on hedging practices of non-financial firms listed at NSE

- v. Determine the influence of managerial risk aversion on hedging practices of non-financial firms listed at NSE

### **1.5 Hypothesis**

The study used univariate and multivariate analytical technique to establish the effect of the afore-mentioned factors on hedging practices of listed firms at 95% confidence level (Afza & Alam, 2011). The study sought to test the following hypotheses:

HA1: Financial distress significantly influences hedging practices of non-financial firms listed at the NSE.

HA2: Underinvestment cost significantly influences hedging practices of non-financial firms listed at the NSE

HA3: Economies of scale significantly influence hedging practices of non-financial firms listed at the NSE.

HA4: Non-financial firms' foreign exposure significantly influences their hedging practices.

HA5: Managerial risk aversion significantly influence hedging practices of non-financial firms listed at the NSE.

### **1.6 Justification of the Study**

Kenya is heavily dependent on imports, thus, its market aggregates are vulnerable to external shocks (Turana, 2011). Exchange, inflation and interest rates have been highly volatile in Kenya. This is not helped by the fact that most non-financial firms don't have

solid policies on financial risk hedging. This quintessences the need for hedging in Kenya.

This study is important to various groups of persons. To begin with, the study is significant to investors because as the global market become volatile, various risks a rise from exchange rates movements, commodity price fluctuations, interest rates changes, among others that affect companies, and hence pose a threat to their investment portfolios. Thus, investors will benefit from good risk mitigation and management strategies which the study seeks to establish. Proper use of the findings would be invaluable in safe guarding investors' investments against risk. By extrapolation, the study would also help the Kenyan government realize its dreams of making the country an investment hub. This owes to the fact that should risks be favorably mitigated, more investors would be attracted to Kenya or more citizens will invest in the country thus leading to better macro-economic managerial risk aversion.

Secondly, it is important to policy makers and regulators. The Capital market Authority (CMA) has strove to develop derivative market in the Country. The study's findings might result in companies in Kenya and beyond accepting derivative use thus developing the nascent market in the country. Capital Market Authority would also make the necessary policies that enhance uptake of derivatives. Such developments in the Kenya's capital market would profit the entire country by providing alternative means of investment whose economic benefits would have a trickle-down effect on the residents'/citizens' living standards.



Thirdly, the study would be a source of reference for future researchers, academicians, consultants and students on related topics. Further, academicians and consultants would find this study useful in learning the financial risk management strategies. The knowledge thus gained would be useful for pedagogical purposes.

### **1.7 Scope of the Study**

The study focused on how financial distress, underinvestment cost, economies of scale, foreign exposure and managerial risk aversion influence non-financial firms' decisions to hedge against the financial risks that they face. The study assessed use of derivative instruments as a measure of their hedging practices and tested this against the five independent variables. The study focused on the five independent variables as guided by literature review where most of the studies done in other jurisdiction were mainly on the five independent variables that were also of interest to this study.

The scope of the study is also geographically emphasized. The scope was, thus, the non-financial companies listed at the NSE. As at the end of 2011, there were 39 non-financial firms in the Security Exchange. The current study was on non-financial firms since most of previous studies have been devoted to financial firms with very little studies existing on nonfinancial firms in Kenya. The study used listed firms since as per the companies act; listed companies must publish their financial statements annually. The annual financial statements of these companies were sort and proxies of financial distress, underinvestment cost, firm size, foreign exposure and managerial risk aversion looked at.

## **1.8 Limitations of the Study**

The study faced a number of limitations. The study used t-test statistics to compare hedging and non-hedging companies. Nevertheless, the study's findings were not generalized to financial firms as they were beyond the scope of the study.

The study also considered the reliability and adequacy of data collected. To mitigate this, both primary and secondary data were collected which complemented each other as both sources have their merits and demerits. While annual reports contain information that might be difficult or impossible to obtain through the questionnaires as it is meant for other purposes, questionnaire enabled the study obtain information not contained in the financial reports; finer details of the non-quantifiable hedging practices.

Thirdly, the study was limited by the difficulty in gaining access to the sampled respondents. The target population consisted of large firms that have strict information disclosure procedures with some disclosing absolutely no information to 'outsiders'. The conservative nature of corporate entities and oaths of secrecy by personnel not to disclose information that is strategic in nature was the biggest challenge. Moreover, information on financial risk management was generally viewed as predisposing them to competition. However, this constraint was overcome by using introductory letter from the University. Official consent to carry out the study from the corporations' senior management and assurance of confidentiality of information obtained also mitigated this limitation.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter presents a review of related literature on the subject under study presented by various researchers, scholars, analyst and authors. The research has drawn materials from several sources which are closely related to the theme and the objectives of the study. Models by scholars are used to illustrate the various sub topics mentioned. Generally, this section covers the theoretical and empirical review.

#### **2.2 Theoretical Review**

Existing hedging theories segregate determinants of hedging usage in two mainstreams reviewed by the study in four subsections. The first one is, shareholder's wealth maximization hypothesis that hedging instruments are employed by corporations to minimize cash flow variability by reducing financial distress cost, underinvestment problem, agency cost of debt and tax convexity while managerial risk aversion hypothesis states that, in order to protect their equity value, managers use hedging instruments in their own best interests (Afza & Alam, 2011). The current study was underpinned by four theories that is firm value maximization theory, Agency theory, Stakeholder theory and Prospect theory.

##### **2.2.1 Firm Value Maximization Theory**

Firm value maximization theories states that firms can hedge to reduce certain costs or capital market imperfections related to volatile cash flows. There are typically three lines

of explanations. First, hedging can reduce deadweight costs of financial distress (Mayers and Smith (1982), Smith and Stulz (1985)). Second, hedging may also be motivated by tax incentives. When firms face a convex tax function, hedging should help reduce expected taxes (Mayers and Smith (1982), Smith and Stulz (1985)). Hedging can also increase a firm's debt capacity, by generating greater tax advantages from greater leverage (Leland (1998)). These two explanations imply that corporate hedging can add value when firms face convex costs such as progressive taxation and bankruptcy costs. Similarly MacKay and Moeller (2007) argue that hedging can add value if revenues are concave in product prices.

This theory is based on the fact that, exchange rate exposure has potentially positive or negative impact on the profitability and value of the firm. This is captured in the valuation process in terms of the firm's stock returns. Thus, the approach to modeling the exchange rate exposure has been to regress the exchange rate on firms' returns. Based on research of Smith and Stultz (1985), the tax structure would influence a company's hedging decision. As long as the cost of hedging is not too large, a firm that can reduce the variability of its pre-tax firm value through hedging would be able to reduce its expected tax liability and increase its expected post-tax firm value. Fisher's (1907) on interest rates made it clear that the value of an investment project is equal to the discounted cash flow that this investment generates to its owner(s). The most simple and intuitive formula illustrating this principle is the investment formula calculating the present value of a single investment project under certainty. The Modigliani-Miller Theorem is a cornerstone of modern corporate finance. At its heart, the theorem is an

irrelevance proposition: The Modigliani-Miller Theorem provides conditions under which a firm's financial decisions do not affect its value. Modigliani-Miller (1980) explains that with well-functioning markets (and neutral taxes) and rational investors, who can undo the corporate financial structure by holding positive or negative amounts of debt, the market value of the firm – debt plus equity depends only on the income stream generated by its assets as shown in equation.

### **2.2.2 Agency Theory**

The concept of agency theory originated from the work of Adolf Augustus Berle and Gardiner Coit Means, as early as 1932. Berle and Means saw how the interests of the directors and managers of firms differ from those of the owner and used the concepts of agency and principal to explain the origins of these conflicts. Jensen and Meckling shaped the work of Berle and Means in the context of the risk-sharing research popular in the 1960s and '70s to develop agency theory as a formal concept. Jensen and Meckling formed a school of thought arguing that corporations are structured to minimize the costs of getting agents to follow the direction and interests of the principals (Fleming, Heaney & McCosker, 2005).

Agency theory argues that in the modern corporation, in which share ownership is widely held, managerial actions depart from those required to maximize shareholder returns. These include incentive schemes for managers which underinvest cost them financially for maximizing shareholder interests. Such schemes typically include plans whereby senior executives obtain shares, perhaps at a reduced price, thus aligning

financial interests of executives with those of shareholders (Jensen & Meckling, 1976). Other similar schemes tie executive compensation and levels of benefits to shareholders' returns and have part of executive compensation deferred to the future to underinvest cost long-run value maximization of the corporation and deter short-run executive action which harms corporate value.

Agency theory extends the analysis of the firm to include separation of ownership and control, as well as managerial motivation. In the field of corporate risk management, agency issues have been shown to influence managerial attitudes toward risk taking and hedging (Smith & Stulz, 1985). Agency theory also explains a possible mismatch of goals between shareholders, management and debt-holders caused by asymmetries in earnings distribution, which can result in the firm taking too much risk or not engaging in positive net value projects (Mayers & Smith, 1987). Consequently, agency theory implies that defined hedging policies can have important influence on firm value (Fite & Pflleiderer, 1995).

According to Aretz, Bartram and Dufey (2007), conflicts resulting from the principal-agent relationship between shareholders and managers might emerge, as shareholders can usually diversify away the idiosyncratic risk of their positions, whereas for managers this is often difficult at the personal level. In particular, the difficulty to diversify away idiosyncratic risk arises through the tied relationship between managers and the firm, which is manifested in managers' proportion of wealth invested in the firm, years worked for the firm, specific asset expertise, reputation, etc. As a result, some

managerial decisions – such as the engagement in conglomerate mergers or suboptimal debt levels – benefit managers, as they lower the risk attached to their wealth positions, while they are not beneficial to shareholders (ibid). Agency costs arise in this situation through shareholders' efforts to reduce non-maximizing behavior, e.g. through close monitoring managerial motivation factors which influence the implementation of hedging have been investigated empirically in a few studies to an overall negative effect (Faff & Nguyen, 2002). Notably, positive evidence was found by Tufano (1996) in his analysis of the gold mining industry in the USA.

### **2.2.3 Stakeholder Theory**

Stakeholder theory, originally developed by Freeman (2004) as a managerial instrument, has since evolved into a theory of the firm with high explanatory potential. Stakeholder theory focuses explicitly on equilibrium of stakeholder interests as the main determinant of corporate policy. The most promising contribution to risk management is the extension of implicit contracts theory (a part of stakeholder theory) from employment to other contracts, including sales and financing (Cornell & Shapiro, 1987). In certain industries, particularly high-tech and services, consumers' trust in a company can substantially contribute to the company's value. The value of implicit claims is highly sensitive to expected costs of financial distress and bankruptcy.

Since corporate risk management practices lead to a decrease in these expected costs, company value rises (Klimczak, 2005). The more sensitive a company's value is to

financial distress, the higher the motivation for hedging. Investigations of the financial distress hypothesis (Smith & Stulz, 1985) provide only indirect evidence (Judge, 2006).

#### **2.2.4 Prospect Theory**

Prospect theory is a behavioral economic theory that describes decisions between alternatives that involve risk, where the probabilities of outcomes are known. The theory was developed by Daniel Kahneman and Amos Tversky in 1979 as an accurate description of preferences. It describes how people choose between probabilistic alternatives and evaluate potential losses and gains (Kahneman & Tversky, 1979). The theory says that people make decisions based on the potential value of losses and gains rather than the final outcome, and that people evaluate these losses and gains using heuristics.

The theory describes the decision processes in two stages, editing and evaluation. In the first, outcomes of the decision are ordered following some heuristic. In particular, people decide which outcomes they see as basically identical, set a reference point and then consider lesser outcomes as losses and greater ones as gains. In the following evaluation phase, people behave as if they would compute a value (utility), based on the potential outcomes and their respective probabilities, and then choose the alternative having a higher utility (McDermott, Fowler & Smirnov, 2008).

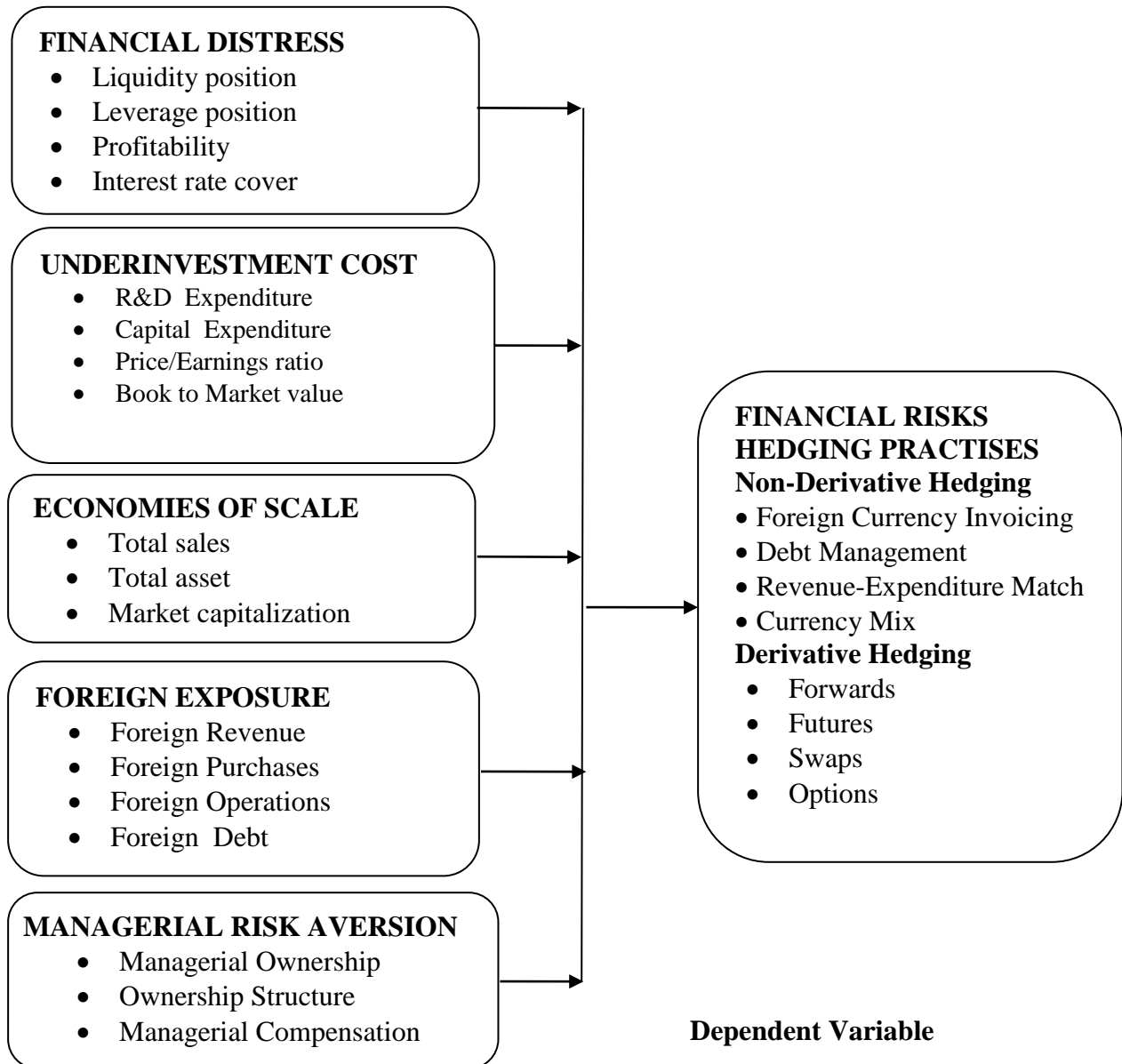
### **2.3 Conceptual Framework**

The main variable for this study was determinants of hedging practices of financial risks among non-financial firms as the dependent variable. The conceptual framework shown



in figure 2.1 presents both derivative hedging indicated by forwards, futures, swaps and options, and non-derivative hedging practices such as using foreign currency invoicing, debt management, matching revenue with expenditure and favorable foreign currency mix. The dependent variable is being influenced by financial distress factors, under investment factors, economics of scale factors, foreign exposure factors and managerial risk aversion factor as the independent variables. Indicators of financial distress are liquidity and leverage position of the firm, profitability and interest rate cover (Bartram, Brown and Fehle, 2009).

Underinvestment cost is designated by firm's research and development (R&D) expenditure, capital expenditure, price/earnings ratio, book to market value, and cashflow (Judge, 2006). Pointers of economies of scales are total sales, total asset and market capitalization, and foreign exposure is indicated by foreign revenue, purchases, operations and debt (Khun, 2007). Managerial risk aversion is measured by managerial ownership, ownership structure and managerial compensation (Clark et al., 2006). Based by the findings in the empirical literature, the key determinants of hedging financial risks were shown in the conceptual framework figure 2.1



**Figure 2.1: Conceptual Framework**  
 Source: Author (2017)

### **2.3.1 Financial Distress**

Financial distress may lead a firm to default on a contract, and it may involve financial restructuring between the firm, its creditors, and its equity investors (Bartram, Brown & Fehle, 2009). Brown and Fehle further state that cash flow volatility can lead to situations where a firm's available liquidity is insufficient to fully meet fixed payment obligations, such as wages and interest payments, on time. Financial risk management can reduce the probability of encountering such states of nature and thus lower the expected value of costs associated with financial distress (Stulz, 2002). Likewise, lowering the chance of financial distress can increase the optimal debt-equity ratio and therefore the associated tax shield of debt (Graham & Rogers, 2002).

The hedging stem from relaxing the Miller and Modigliani (1958) assumption that firm value will remain the same in the presence of hedging. Bartram, Brown and Fehle, (2009) argue that, by reducing the variability of cash-flows, hedging contributes to diminishing bankruptcy costs. That is, hedging reduces the probability of financial distress states and its associated costs. Therefore, risk is managed more often in distressed firms.

Financial distress variable predict that firms with higher leverage, shorter debt maturity, lower interest coverage, and less liquidity (e.g., lower quick ratio) are more likely to hedge financial risk (Bartram, Brown and Fehle, 2009). Similarly, firms with higher dividend yield are less likely to be financially constrained since these firms are more likely to have stable cash flows and lower financial constraints (Graham and Rogers,

2002). Firms with higher profitability and firms with a larger fraction of tangible assets are expected to have lower financial distress costs and are thus less likely to hedge. Since bankruptcy costs are less proportional to firm size, smaller firms should be more likely to hedge (Bartram, Brown and Fehle, 2009).

The reduction of expected financial distress and even bankruptcy costs cannot be accomplished externally by the firm's shareholders, and corporate risk management is therefore the only way to mitigate financial distress costs (Khun, 2007). Khun argue that firms can counteract on costs of financial distress not only through risk management but also by maintaining enough liquidity and other substitutes for risk management by hedging with financial instruments, such as a low dividend payout.

Cui and Vaja (2008) used five variables to measure the financial distress factor. First of all, this driver can be captured by the firm's ability to meet its interest payments in the course of ongoing business. This was measured through Interest Coverage (IC) ratio (Judge, 2006). Since a firm that has a higher IC ratio has a lower probability of going bankrupt, we expect a negative relationship between this ratio and hedging. Secondly, the leverage of the firm could be represented through the Gearing Ratio (GR); computed as the ratio of total equity over total assets.

Intuitively, as a firm has an increased leverage, it will have a higher probability of using instrumental hedging tools (Judge, 2006 ;Lel, 2006). So, this ratio's effect on the derivatives decision should be negative. Hedging can increase the debt capacity and, consequently, tax benefits, which helps to increase firm value (Lel, 2006). Previous

research used Debt-to-Assets as leverage proxy, for which they had positive sign expectations. A measure relating the liquidity constraint as a source of financial distress is the Dividend Payout (DP) ratio. According to Lel (2006), it is possible for companies that pay dividends more often to have an increased exposure to bankruptcy states.

In a fourth respect, the Current Ratio (CR) reflects the firm's capability of avoiding financial distress states by increasing its short-term liquidity. A higher Current Ratio could result in a lower probability of implementing instrumental hedges (Cui & Vaja, 2008). Therefore the following hypothesis was proposed:

### **2.3.2 Underinvestment Cost**

Risk management can increase shareholder value by harmonizing financing and investment policies (Froot et al., 1993). When raising external capital is costly, firms may under-invest. Derivatives can be used to increase shareholder value by coordinating the need for and availability of internal funds. Conflicts of interest between shareholders and debt holders can also lead to underinvestment. An underinvestment problem can occur when leverage is high and shareholders only have a small residual claim on a firm's assets, thus the benefits of safe but profitable investment projects accrue primarily to bondholders and may be rejected by managers (Bartram, Brown and Fehle, 2009). A credible risk management plan can mitigate underinvestment costs by reducing the volatility of firm value.

As the underinvestment problem is likely to be more severe for firms with significant growth and investment opportunities, various measures such as the market-to-book ratio, research and development (R&D) expenses to sales ratio, capital expenditure to sales, net assets from acquisitions to size; are used for testing the underinvestment hypothesis (Adam & Fernando, 2006). Bartram, Brown and Fehle (2009) suggest that underinvestment is likely to be most severe for highly levered firms with significant growth opportunities and thus interacts the market-to-book ratio (among others) with leverage to quantify this effect.

Implication of imperfect capital markets draws from the fact that external finance is costly. More precisely, the argument of Froot *et al.* (1993) states that companies which do not hedge their cash-flows might have to under-invest in states where they need external financing, but in which the cost of capital raised is higher than the return on their investment opportunities. In this light, hedging is advantageous to the firm if it is able to remove unnecessary fluctuations in the firm's earnings. Moreover, Cui and Vaja (2008) argue that hedging should be done in a higher proportion for firms with higher investment opportunities and with higher asymmetry costs. In other words, they predict that hedging is done most by firms that are small (higher information asymmetry) and by the ones that have substantial growth prospects (investment opportunities). It is anticipated that underinvestment situations positively influence the hedging of financial risk.

Smaller firms have a more restricted access to financing due to higher leverage or higher transactions costs (Cui and Vaja, 2008). When these firms meet with growth opportunities, the underinvestment issue is triggered. In consequence, hedging could provide the necessary liquidity for smaller firms to off-set their underinvestment costs. Hence, firm Size (S) could capture this and the expected sign should be negative (Judge, 2006). Previous studies employ the Research and Development (R&D), Capital Expenditure (KE), Price/Earnings (PE) and Market-to-Book Value (MB) ratios to measure the firm's potential growth opportunities (Judge, 2006 and Lel, 2006). Lel (2006) indicate that these predictors might not fully capture the effect of underinvestment on the hedging decision because these ratios reflect only growth prospects, but in which leverage could be low (i.e., the cost of financing is low).

Clark, Judge and Ngai (2006) provide evidence that corporate hedging is negatively related to the liquidity of the company. Higher liquidity provides firms with a better ability to meet their debt obligations and finance their ongoing activity. Therefore, hedging is a tool that compensates for the lack of liquidity; two indicators are used the Current Ratio (CR) and the Dividend Payout (DP) ratios. Both are expected to have a negative sign relative to the hedging decision. A higher CR reflects higher liquidity. DP is expected to have a decreasing effect on the dependent variable because liquidity is maintained through the retention of earnings. Therefore, a lower payout ratio implies lower liquidity, which is expected to increase the hedging probability. Therefore the following hypothesis was proposed:

### **2.3.3 Economies of Scale**

There are factors that cause a producer's average cost per unit to fall as the scale of output is increased. The common sources of economies of scale are purchasing (bulk buying of materials through long-term contracts), managerial (increasing the specialization of managers), financial (obtaining lower-interest charges when borrowing from banks and having access to a greater range of financial instruments), marketing (spreading the cost of advertising over a greater range of output in media markets), and technological (taking advantage of returns to scale in the production function) (Sullivan & Sheffrin, 2003). In this study, Economies of scale refers to size of the company.

Khun (2007) found out that while large firms have advantages in economies of scale in relation to information and knowledge about the implementation of a corporate risk management program and also advantages concerning transaction costs and costs in the administration of corporate risk management, small firms are faced with clear disadvantages when it comes to the realization of corporate risk management activities. Larger firms can utilize economies of scale; on the other hand, small firms, according to a theory by Warner (1977), face proportionally higher costs of financial distress than larger firms and are therefore more inclined to manage their risks and use derivatives or foreign debt to lower their exposure (Khun, 2007).

In Sullivan and Sheffrin's (2003) view, larger firms are usually rated by the financial markets to be more 'credit worthy' and have access to credit facilities, with favourable rates of borrowing which in turn reduces their financial distress. In contrast, smaller



firms often face higher rates of interest on overdrafts and loans. Businesses quoted on the stock market can normally raise fresh money (i.e. extra financial capital) more cheaply through the issue of shares. They are also likely to pay a lower rate of interest on new company bonds issued through the capital markets.

Mian (1999) studied the annual reports of 3,022 companies in 1992 and found that 771 of these firms did some risk hedging during the course of the year. Of these firms, 543 disclosed their hedging activities in the financial statements and 228 mentioned using derivatives to hedge risk but provided no disclosure about the extent of the hedging. Looking across companies, he concluded that larger firms were more likely to hedge than smaller firms, indicating that economies of scale allow larger firms to hedge at lower costs. As supportive evidence of the large fixed costs of hedging, note the results of a survey that found that 45% of Fortune 500 companies used at least one full-time professional for risk management and that almost 15% used three or more fulltime equivalents.

Bartram, Brown and Fehle (2009) empirically tested the extant theories on US firms. They found that firms that are larger, exhibit a higher propensity to use derivatives. This indicates that large firms enjoy economies of scale in the costs associated with purchasing derivatives. For the effect of firm size on the hedging decision, empirical studies provide evidence favorable to the transaction costs economies of scale argument rather than to either the underinvestment or financial distress determinants (Clark, Judge and Ngai, 2006, Judge, 2006 and Lel, 2006).

Martina and Mauer (2003) studied the scale economies in hedging foreign exchange cash flow exposures. They sampled U.S.-based multinational corporations (MNCs) with heavy involvement in Europe and found that they are less frequently exposed to European currency risk than to non-European currency risk. The findings also indicate that 60% of the time, the MNCs without European exposure are found to have non-European exposure. These results are likely due to scale economies in foreign exchange exposure hedging that has been recently suggested in the literature. To the extent that economies of scale in hedging exist, it is likely that MNCs can achieve these economies in areas where they conduct substantial business activities, thus are more able to justify the necessary hedging programs. Therefore the following hypothesis was proposed:

#### **2.3.4 Foreign Exposure**

Foreign exposure brings about economic exposure, competitive exposure, or strategic exposure and is measured as a change in the present value of the firm, which results from any change in future operating cash flows caused by unexpected changes in exchange rates and foreign engagements. Real assets are affected through exchange rate movements, through effects on aggregate demand or the cost of traded inputs (Pantzalis, Simkins & Laux, 2001). Exchange rate risk is defined as the variability of a firm's value due to uncertain changes in the rate of exchange.

State the extent of corporate hedging (or corporate risk management) can be determined by various exposure factors such as foreign sales and foreign trade, (Allayannis & Ofek (2001). Khun (2007) states that the larger the (economic) exposure a company is facing,

the more likely it is that the company will commit to corporate risk management activities). Foreign exposure results in unexpected changes on the firm's input costs and output price, (Pantzalis *et al.*, 2001). For example, if costs are incurred in the local currency but sales are earned in the foreign currency, depreciation in the local currency will increase profits. Also, if both costs and profits are in a foreign currency, depreciation of the local currency will increase profits.

Managing foreign exposure with the concept of risk management can be done through hedging by entering into an offsetting currency position so that whatever is lost/gained on the original currency exposure, is exactly offset by a corresponding currency gain/loss on the currency hedge (Clark *et al.*, 2006). Foreign exposure is commonly used in the literature to capture foreign exchange risk. Instrumental hedging is in many situations the most feasible tool when dealing with currency risk. LeI (2006) established that foreign exposure has a substantial positive impact on using derivatives. The Foreign Revenue Percentage (FR) and the Foreign Operations Dummy (FD) can be used to measure the exposure to foreign exchange risk (Judge, 2006). Between both proxies and the hedging decision positive relationships have been shown (Clark *et al.*, 2006 and LeI, 2006).

Allayannis and Ofek (2001) analyzed the link between foreign exposure and the use of currency derivatives for a sample of non-financial S&P 500 firms. They used reported information on financial instruments with off-balance sheet risk, which firms in the U.S. have been required to report under SFAS No 105 since 1991, to investigate whether

currency derivatives usage reduced firms' foreign exposure. Their evidence suggested that derivatives usage reduced foreign exposure.

Wong (2000) investigated the foreign exposure of manufacturing firms in the U.S. to test for an association between foreign exposure and derivative disclosures required by the SFAS No 119 (and its predecessors SFAS No 105 and 107). He documented weak associations between derivative disclosures and FX exposure and suggested that this can be due to inability in controlling of firms' inherent exposures and shortcomings of the accounting disclosures.

Pantzalis et al. (2001) point out that transaction exposure can be easily hedged using currency derivatives, but that operational hedges are significant determinants of exchange rate risk, as measured by the breadth and depth dimensions of the multinational corporation's foreign subsidiary network. A firm's ability to construct operational hedges effectively reduces exposure to currency risk for firms with either positive or negative exposures. Operational hedges are best suited to manage the impact of exchange rate changes on the firm's competitive position across markets and products. Operating flexibility is the ability to shift factors of production across borders and to transfer resources within a network to take advantage of exchange-rate movements. They found that the impact of the firm's ability to construct operational hedges effectively reduces exposure to currency risk for firms with either positive or negative exposures. Therefore the following hypothesis was proposed:

### **2.3.5 Managerial Risk Aversion**

The ownership structure of an organization and the type of managerial compensation, originally addressing concerns related to managerial risk aversion and the agency cost problem, have significant impact on a company's decision to implement corporate risk management strategies or to hedge financial risks using derivatives or foreign debt. Risk management activities on corporate level support shareholders in their task to align managers' actions to the objectives of the shareholders (the classical agency cost problem) (Clark et al., 2006). If risk averse managers know that market risks that lie outside their control are being handled by risk management activities, they have incentives to increase shareholder value due to the fact that their managerial risk aversion can directly be evaluated by the stock price and the overall managerial risk aversion of the company (May, 1995).

Furthermore, managerial stock ownership is an obvious incentive for managers to act according to the objectives of the shareholders, and will influence managers' risk perception. Firm-wide hedging makes managerial stock ownership a more effective device to induce managers to maximize firm value (Stulz, 2003). However, some form of managerial compensation such as options on the company's stocks might induce managers to become risk seekers, hence hedge less, and to take on more risks which will have negative impact on shareholders' wealth. Other compensation contracts, depending on the relation between firm value and management compensation payoff, will induce managers to hedge the complete value of the firm or only a part of it.

Equally alike is the impact of different kinds of investors on a company's decision to pursue corporate risk management. Depending on the controlling ownership, an investor will influence the management team to adjust the risk management activities of the company according to the investor's individual interest and motivation. In general, however, and similar to the situation of the management of a company, investors holding large stakes in a company will value a corporate risk management program because of their undiversified position. They want their risks to be reduced, which can be reached by corporate risk management and hedging (Stulz, 2000). Firms, in addition, want to hold and support large investors for reasons such as their controlling and monitoring position which also adds value to a company (Stulz, 2003). The following hypothesis was proposed:

#### **2.4 Empirical Review**

By using 100 U.S oil and gas producer companies, Haushalter (2000) identified the determinants of decision to use derivatives and the extent of such decision. By taking fraction of oil and gas revenue being hedged as dependent variable, independent variables are regressed via Tobit model. Study estimates a positive relation between decision to use derivative and leverage, debt constraint, investment expenditures and tax convexity. While dividend payout, managerial ownership and basis risk have demonstrated negative effect on a firm's decision to hedge risk exposure.

Study by Brown, Crabb, and Haushalter (2002) also examine the gold mining industry and find evidence consistent with managers changing hedge ratios as the result of

speculative motives. In a study of the oil and gas industry, Haushalter (2000) found support for the relationship between hedging and financial distress costs. On the other hand, Brown (2001) undertook a clinical study of a U.S.-based manufacturer's use of FX derivatives and found little support for the financial distress (or other popular) theories of risk management and instead proposed that hedging is motivated by earnings management, competitive factors in the product market, or internal contracting efficiency gains.

Cui and Vaja (2008) used five variables to measure the financial distress factor. First of all, this driver can be captured by the firm's ability to meet its interest payments in the course of ongoing business. This was measured through Interest Coverage (IC) ratio (Judge, 2006). Since a firm that has a higher IC ratio has a lower probability of going bankrupt, we expect a negative relationship between this ratio and hedging. Secondly, the leverage of the firm could be represented through the Gearing Ratio (GR); computed as the ratio of total equity over total assets.

Intuitively, as a firm has an increased leverage, it will have a higher probability of using instrumental hedging tools (Judge, 2006 and Lel, 2006). So, this ratio's effect on the derivatives decision should be negative. Hedging can increase the debt capacity and, consequently, tax benefits, which helps to increase firm value (Lel, 2006). Previous research used Debt-to-Assets as leverage proxy, for which they had positive sign expectations. A measure relating the liquidity constraint as a source of financial distress

is the Dividend Payout (DP) ratio. According to Lel (2006), it is possible for companies that pay dividends more often to have an increased exposure to bankruptcy states.

Warner (1977) criticized the view that larger firms are more likely to hedge than smaller firms. In his argument, he states that costs of financial distress is higher for smaller companies, and smaller companies consequently being rather motivated to pursue risk management than larger firms are more motivated to hedge or are more inclined to manage their risks and use derivatives or foreign debt to lower their exposure. Lel (2006) investigated the impact of corporate governance on the importance of different rationales for hedging at the firm level and found that managers may use corporate hedging to increase the utility of their compensation packages particularly in firms with weak governance.

Research by Afza and Alam (2011) aimed to determine the factors affecting firms hedging policies of both foreign currency and interest rate derivative instruments of 105 non-financial firms listed on Karachi Stock Exchange for the period of 2004-2008. Logit model was used to test whether the company's decision to use hedging instruments can increase firm value. For a detailed analysis, firm's endogenous policies were regressed separately to identify the effect of firm's investment and financing policies on firm's hedging policies. The estimated results supported the financial distress hypothesis, tax convexity, underinvestment hypothesis and managerial risk aversion hypothesis. Though, inconsistent with the theory, interest coverage ratio demonstrated positive effect on firms hedging policies that may be attributed to the lag period effect.



Study by Hagelin (2003) used survey data and public data from 1997 to investigate the determinants of foreign exchange risk management practice, in particular the usage of foreign exchange derivatives. Hagelin found that companies hedge transaction exposure to increase firm value by reducing costs of financial distress or alleviating the underinvestment problem. In detail, the examination of company characteristics by logit regressions shows that indirect costs of financial distress (proxied by high human capital investments), valuable growth opportunities (measured by the market-to-book ratio), firm size (logarithm of market value of total assets), and the extent of foreign revenues are significant explanatory variables for the usage of foreign exchange derivatives.

Study by Aabo (2006) investigated the determinants of the importance of foreign debt among Danish non-financial firms. Based on survey data from 2001 the author found that foreign debt is an important alternative for many firms to substitute the use of foreign exchange derivatives for risk management activities. Company characteristics that help explain the importance of foreign debt include the number of countries in which the company has subsidiaries, the market-to-book value of assets (Tobin's Q), and leverage (debt ratio). While the extent of foreign involvement in form of subsidiaries abroad and the debt ratio are positively related to the importance of foreign debt, the relationship between growth opportunities inherent in a company measured by Tobin's Q is negatively related. Furthermore, the probit regression analysis shows that firm size is positively related to the importance of foreign debt as well.

Study by Froot *et al.* (1993) states that companies which do not hedge their cash-flows might have to under-invest in states where they need external financing, but in which the cost of capital raised is higher than the return on their investment opportunities. In this light, hedging is advantageous to the firm if it is able to remove unnecessary fluctuations in the firm's earnings. Moreover, Cui and Vaja (2008) argue that hedging should be done in a higher proportion for firms with higher investment opportunities and with higher asymmetry costs. In other words, they predict that hedging is done most by firms that are small (higher information asymmetry) and by the ones that have substantial growth prospects (investment opportunities). It is anticipated that underinvestment situations positively influence the hedging of financial risk.

Smaller firms have a more restricted access to financing due to higher leverage or higher transactions costs (Cui and Vaja, 2008). When these firms meet with growth opportunities, the underinvestment issue is triggered. In consequence, hedging could provide the necessary liquidity for smaller firms to off-set their underinvestment costs. Hence, firm Size (S) could capture this and the expected sign should be negative (Judge, 2006). Previous studies employ the Research and Development (R&D), Capital Expenditure (KE), Price/Earnings (PE) and Market-to-Book Value (MB) ratios to measure the firm's potential growth opportunities (Judge, 2006 and Lel, 2006). Lel (2006) indicate that these predictors might not fully capture the effect of underinvestment on the hedging decision because these ratios reflect only growth prospects, but in which leverage could be low (i.e., the cost of financing is low).

Paper by Clark, Judge and Ngai (2006) provide evidence that corporate hedging is negatively related to the liquidity of the company. Higher liquidity provides firms with a better ability to meet their debt obligations and finance their ongoing activity. Therefore, hedging is a tool that compensates for the lack of liquidity; two indicators are used the Current Ratio (CR) and the Dividend Payout (DP) ratios. Both are expected to have a negative sign relative to the hedging decision. A higher CR reflects higher liquidity. DP is expected to have a decreasing effect on the dependent variable because liquidity is maintained through the retention of earnings. Therefore, a lower payout ratio implies lower liquidity, which is expected to increase the hedging probability.

Study by El-Masry (2003) sought to determine the derivatives usage in the UK Non-financial Companies. El-Masry used a questionnaire survey focused on determining the reasons for using or not using derivatives for 401 UK non-financial companies. The results indicate that larger firms are more likely to use derivatives than medium and smaller firms, public companies are more likely to use derivatives than private firms, and derivatives usage is greatest among international firms. The results also show that, out of firms not using derivatives, half of firms do not use these derivative instruments because their exposures are not significant and that the most important reasons they do not use derivatives are: concerns about disclosures of derivatives activity required under FASB rules, and costs of establishing and maintaining derivatives programmes exceed the expected benefits. The results show that foreign exchange risk is the risk most commonly managed with derivatives and interest rate risk is the next most commonly

managed risk. The results also indicate that the most important reason for using hedging with derivatives is managing the volatility in cash flows.

A survey by El-Masry (2006) in U.K. non-financial firms concerning fiscal year 2001 verifies that larger firms use derivatives more often than medium and small size firms, while derivatives usage is more extensive in multinational firms. Half of the derivatives non-users claim lack of sufficient exposure to risks and seem to worry about the perception of hedging by analysts and investors. Risk management activities of derivatives users appear to be a centralized issue, the foreign exchange risk seems to be a more common hedging objective compared to interest rate risk and the lack of sufficient knowledge concerning derivatives appears to create the most concern among contract users.

Research by Khun (2007) found out that while large firms have advantages in economies of scale in relation to information and knowledge about the implementation of a corporate risk management program and also advantages concerning transaction costs and costs in the administration of corporate risk management, small firms are faced with clear disadvantages when it comes to the realization of corporate risk management activities. Larger firms can utilize economies of scale; on the other hand, small firms, according to a theory by Warner (1977), face proportionally higher costs of financial distress than larger firms and are therefore more inclined to manage their risks and use derivatives or foreign debt to lower their exposure (Khun, 2007).

In Sullivan and Sheffrin's (2003) view, larger firms are usually rated by the financial markets to be more 'credit worthy' and have access to credit facilities, with favourable rates of borrowing which in turn reduces their financial distress. In contrast, smaller firms often face higher rates of interest on overdrafts and loans. Businesses quoted on the stock market can normally raise fresh money (i.e. extra financial capital) more cheaply through the issue of shares. They are also likely to pay a lower rate of interest on new company bonds issued through the capital markets.

Study by Mian (1999) examined the annual reports of 3,022 companies in 1992 and found that 771 of these firms did some risk hedging during the course of the year. Of these firms, 543 disclosed their hedging activities in the financial statements and 228 mentioned using derivatives to hedge risk but provided no disclosure about the extent of the hedging. Looking across companies, he concluded that larger firms were more likely to hedge than smaller firms, indicating that economies of scale allow larger firms to hedge at lower costs. As supportive evidence of the large fixed costs of hedging, note the results of a survey that found that 45% of Fortune 500 companies used at least one full-time professional for risk management and that almost 15% used three or more fulltime equivalents.

Bartram, Brown and Fehle (2009) empirically tested the extant theories on US firms. They found that firms that are larger, exhibit a higher propensity to use derivatives. This indicates that large firms enjoy economies of scale in the costs associated with purchasing derivatives. For the effect of firm size on the hedging decision, empirical

studies provide evidence favorable to the transaction costs economies of scale argument rather than to either the underinvestment or financial distress determinants (Clark, Judge and Ngai, 2006, Judge, 2006 and Lel, 2006).

Research by Martina and Mauer (2003) studied the scale economies in hedging foreign exchange cash flow exposures. They sampled U.S.-based multinational corporations (MNCs) with heavy involvement in Europe and found that they are less frequently exposed to European currency risk than to non-European currency risk. The findings also indicate that 60% of the time, the MNCs without European exposure are found to have non-European exposure. These results are likely due to scale economies in foreign exchange exposure hedging that has been recently suggested in the literature. To the extent that economies of scale in hedging exist, it is likely that MNCs can achieve these economies in areas where they conduct substantial business activities, thus are more able to justify the necessary hedging programs.

Paper by Covitz and Sharpe (2005) compiled and analyzed detailed information on the debt structure and interest rate derivative positions of non-financial firms in 2000 and 2002. They found that differences in debt structure across firms and time tend to be counterbalanced by differences in derivative positions. In particular, among derivative users, smaller firms tend to have relatively more interest rate exposure from liabilities than larger firms and tend to use derivatives that offset these exposures. Larger firms also tend to limit their interest rate exposures, but they do so through their choice of debt structure rather than with derivatives. On the other hand, the study found that a large

fraction of the change in derivative positions over time cannot be explained by changes in debt structure. The study found that non-financial firms hedge interest rate exposures from their operating assets, but do not see this as supporting the hypothesis that firms use derivatives to speculate.

Study by Rossi (2007) examined the decision of Brazilian firms to hedge, and their choice of instruments, over the period 1996 to 2004, using a data set that is substantially similar to this study. Results from this study on the driving factors behind the hedging decision are similar: this decision depends on the size of the firm and the extent of foreign currency debt. While this study's focus is on the effect of hedging on firm value and financial managerial risk aversion, in the last section of the paper, it accounts for the endogeneity in the decision to hedge.

Paper by Moraa (2010) established that Kenya Airways Limited (KQ) hedging practices has maximized on profits and minimized on losses to the company through effective management of fuel price risks. The findings indicate that the use of forwards and futures has been able to effectively manage fuel price risks. With regard to challenges facing KQ when determining fuel hedges, the study found that KQ should enter into short term contracts, hedge 50% of its fuel requirements and hire hedge experts to negotiate fuel hedge contracts on their behalf. The study recommended that KQ should continue hedging as it manages fuel price risk, stabilizes profits and cash flows. KQ should continue using forwards and futures and also introduce the use of dollars to effectively manage fuel price risk more effectively.

Research by Joseph (2000) examined the relationship between the use of hedging techniques and the characteristics of UK multinational corporations (MNCs). The results indicate that UK firms focus on a very narrow set of hedging techniques and they make much greater use of derivatives than internal hedging techniques. The degree of utilization of both internal and external techniques depends on the type of exposure that is hedged. Furthermore, the characteristics of the firms appear to explain the choice of hedging technique but the use of certain hedging techniques appears to be associated with increase in the variability of some accounting measures.

Study by Marshall (2000) surveyed the foreign exchange risk practices of large UK, US, and Asia Pacific multinational companies (MNCs). The data was collected by the questionnaire sent only to the largest MNCs in each region. He found that statistically significant regional differences in the importance and objectives of foreign exchange risk management, the emphasis on translation and economic exposures, the internal/external techniques used in managing foreign exchange risk and the policies in dealing with economic exposures. He also found that the percentage of overseas business had no statistically significant effect on any of the responses.

Paper by Mallin, Ow-Yong and Reynolds (2001) stated that derivative usage has become increasingly widespread since mid -1980s, particularly among large companies in economies with well-developed financial markets. They also found that only 9 companies out of 231 respondents to their survey used currency futures. The fact currency futures were not being traded in the UK exchanges meant higher transaction



costs would be incurred, also the general lack of confidence in using futures might have deterred the companies.

State the extent of corporate hedging (or corporate risk management) can be determined by various exposure factors such as foreign sales and foreign trade, (Allayannis & Ofek (2001). Khun (2007) states that the larger the (economic) exposure a company is facing, the more likely it is that the company will commit to corporate risk management activities). Foreign exposure results in unexpected changes on the firm's input costs and output price, (Pantzalis *et al.* (2001). For example, if costs are incurred in the local currency but sales are earned in the foreign currency, depreciation in the local currency will increase profits. Also, if both costs and profits are in a foreign currency, depreciation of the local currency will increase profits.

Managing foreign exposure with the concept of risk management can be done through hedging by entering into an offsetting currency position so that whatever is lost/gained on the original currency exposure, is exactly offset by a corresponding currency gain/loss on the currency hedge (Clark *et al.*, 2006). Foreign exposure is commonly used in the literature to capture foreign exchange risk. Instrumental hedging is in many situations the most feasible tool when dealing with currency risk. Lel (2006) established that foreign exposure has a substantial positive impact on using derivatives. The Foreign Revenue Percentage (FR) and the Foreign Operations Dummy (FD) can be used to measure the exposure to foreign exchange risk (Judge, 2006). Between both proxies and

the hedging decision positive relationships have been shown (Clark *et al.*, 2006 and Lel, 2006).

Study by Allayannis and Ofek (2001) analyzed the link between foreign exposure and the use of currency derivatives for a sample of non-financial S&P 500 firms. They used reported information on financial instruments with off-balance sheet risk, which firms in the U.S. have been required to report under SFAS No 105 since 1991, to investigate whether currency derivatives usage reduced firms' foreign exposure. Their evidence suggested that derivatives usage reduced foreign exposure.

Paper by Wong (2000) investigated the foreign exposure of manufacturing firms in the U.S. to test for an association between foreign exposure and derivative disclosures required by the SFAS No 119 (and its predecessors SFAS No 105 and 107). He documented weak associations between derivative disclosures and FX exposure and suggested that this can be due to inability in controlling of firms' inherent exposures and shortcomings of the accounting disclosures.

Another study by Foo and Wayne (2001) explored the determinants of firms' hedging policies by using a sample data of 297 firms of fortune 500 for the period of 1997. Empirical results support underinvestment hypothesis and economies of scale. Leverage though positive, but not considered as an important factor in driving firms hedging policies, whereas mixed findings are documented by tax convexity and managerial ownership. Via survey data, Kapitsinas (2008) studied the usage and practice of derivative instruments of 62 Greece non-financial firms for the year 2005. Survey

findings for motives behind firm's decision to use derivative instruments reported that 61.9% corporations are using derivative instruments for reducing cash flow variability and 47.62% corporations employ derivative instruments to minimize variation in accounting earnings. Hedging the balance sheet account and firm value are the objectives of only 9.52 and 4.76% derivative usage, respectively.

Paper by Coles, Daniel and Naveen (2006) tested sample data of fortune 500 firms for the period of 1992 - 2002. Results support a positive relationship between Vega and riskier policy choices whereas delta depicts negative effect on firm's riskier policies. Existing literature depicts that major part of empirical studies explored hedging patterns of U.S non-financial firms though only few have explored Asian non-financial firms like Faizullah, Azizan and Hui (2008) and Ameer (2009). Graham and Rogers (2002) examined a sample of US firms in the period 1994-95, and found that firms indeed hedge to increase debt capacity; the resultant tax benefits add about 1.1% to firm value. The findings of this study support their key conclusions that derivatives result in higher debt capacity and therefore higher value.

Study by Bartram, Brown and Fehle (2003) studied the use of financial derivatives for a sample of 7,309 non-financial firms from 48 countries. According to the findings, across all countries, 54.3% of the firms use derivatives in general, while 35.9% use currency derivatives, 32.0% interest rate derivatives, and only 9.2% commodity price derivatives. Firms generally use derivatives in line with predictions from theories of shareholder value maximization. However, the study also finds that some evidence of managers

acting in their own best interest (agency costs). Firm-specific factors related to derivatives use were very similar across different countries. However, some factors are related to specific types of risk. Country-specific factors such as economic size, stage of development, and legal origin have explanatory power but do not reduce the overall significance of firm-specific factors. Together these results show that a wide range of factors determine the use of derivatives by non-financial firms thus explaining the mixed results from studies examining primarily U.S. firms. The study found this to be the case only for firms with high interest rate exposure using interest rate derivatives.

## **2.5 Critique of Literature**

Dufey and Srinivasulu (1983) stated that economic theories seem to imply that risk management cannot contribute to the creation of shareholder value. For example, according to the Miller and Modigliani (1958) propositions corporate financing decisions cannot be used to increase firm value in perfect capital markets since shareholders can easily replicate them. Consequently, since risk management can be seen as a financing policy, it cannot contribute to firm value creation in an M&M world (Bartram, 2002 and Stulz, 2000). For corporate risk management to increase firm value, it must be the case that one or more of the assumptions of the M&M framework are violated.

Stulz (2003) in explaining the risk management irrelevance proposition, illustrates that hedging a risk does not increase firm value when the cost of bearing the risk is the same whether the risk is borne within the firm or outside the firm by the capital markets. This

conclusion is derived from the fundamental insight by Miller and Modigliani (1958), which states that corporate financing policies are irrelevant because investors can diversify on their own account. Therefore, if markets are complete and perfect, the value of the firm is independent of its hedging policy (Khun, 2007). This means that companies do not have to commit to corporate risk management or financial hedging because investors can realize risk decreasing (or increasing) actions themselves by trading in various risky assets.

The benefits of corporate hedging (if they exist) should arise due to capital market imperfections, which prevent shareholders from being able to perfectly replicate risk management at the firm level (Stulz 2001). Capital market imperfections that provide positive rationales for corporate risk management consist e.g. of direct and indirect costs of financial distress, costly external financing and taxes. In addition to these firm-specific determinants of risk management, the economic and legal environment of the country a firm is located in may also impact the decision to hedge.

Another study by Foo and Wayne (2001) explored the determinants of firms' hedging policies by using a sample data of 297 firms of fortune 500 for the period of 1997. Empirical results support underinvestment hypothesis and economies of scale. Leverage though positive, but not considered as an important factor in driving firms hedging policies, whereas mixed findings are documented by tax convexity and managerial ownership.

Study by Warner (1977) criticized the view that larger firms are more likely to hedge than smaller firms. In his argument, he states that costs of financial distress is higher for smaller companies, and smaller companies consequently being rather motivated to pursue risk management than larger firms are more motivated to hedge or are more inclined to manage their risks and use derivatives or foreign debt to lower their exposure. Lal (2006) investigated the impact of corporate governance on the importance of different rationales for hedging at the firm level and found that managers may use corporate hedging to increase the utility of their compensation packages particularly in firms with weak governance.

Paper by Stulz (2001) further stated that it is difficult for a company to credibly guarantee the continuing existence of corporate hedging, as it might consider discontinuing risk management, if it winds up in a situation in which taking on more risky projects is very beneficial. Hence, with regards to management, corporate hedging might lower the variability and thus the level of compensation required by managers by decreasing firm-specific risk (Aretz and Bartram, 2009). Moreover, it might lower managers' incentives to pursue more costly diversification strategies, like operative diversification of businesses.

Study by Rossi (2007) examined the decision of Brazilian firms to hedge, and their choice of instruments, over the period 1996 to 2004, using a data set that is substantially similar to this study. Results from this study on the driving factors behind the hedging decision are similar: this decision depends on the size of the firm and the extent of

foreign currency debt. While this study's focus is on the effect of hedging on firm value and financial managerial risk aversion, in the last section of the paper, it accounts for the endogeneity in the decision to hedge.

Harper (2010) stated that firm managers cannot create value for shareholders by taking on projects that shareholders could do for themselves at the same cost; i.e. firm managers should not hedge risks that investors can hedge for themselves at the same cost. In a perfect market, the firm cannot create value by hedging a risk when the price of bearing that risk within the firm is the same as the price of bearing it outside of the firm. However, in practice, financial markets are not likely to be perfect markets (Stulz, 2003).

For risk management to create value, one or several of the assumptions behind this risk management irrelevance proposition must be violated and hence drive a wedge between the cost of hedging inside and outside the firm (Lemming, 2003). Another formulation is that risk management at the company level can only be justified by market imperfections. Based on such imperfections a series of factors that establish a link between company specific risk management and shareholder value have been identified (Stulz, 2003). These factors include: cost of bankruptcy and financial distress, cost of funding new investments, corporate taxation and asymmetric information.

## **2.6 Summary**

This study has looked at the theoretical, conceptual and empirical literature of the determinants of derivatives. Furthermore, criticism of literature is also presented. Some

of the theoretical underpinnings reviewed are: financial economic approach, agency theory and stakeholders' theory. Accord to the financial economic approach, firms hedge to increase their value (Stulz, 2003). Agency theory assesses the separation of ownership and control; this agency issues influence managerial attitudes toward risk taking and hedging. The mismatch of goals between shareholders, management and debt-holders caused by asymmetries in earnings distribution, result in the firm taking too much risk or not engaging in positive net value projects (Faff & Nguyen, 2002). In management view, corporate hedging might lower the earning variability and thus the level of compensation required by managers (Stulz, 2001). Stakeholders' theory focuses primarily on the equilibrium of stakeholder interests as the main determinant of corporate policy. The more sensitive a company's value is to financial distress, the higher the motivation for hedging.

The conceptual framework looked at how financial distress, underinvestment, economies of scale and foreign exposure affects the hedging propensity of non-financial firms. Financial distress is a condition when promises to creditors of a company are broken or honored with difficulty. The study indicates that hedging reduces the probability of financial distress and its associated costs. Thus, firms facing financial distress manage risks more often through hedging instruments like derivative (Bartram, Brown and Fehle, 2009).

Underinvestment refers to a company or the shareholders choosing not to invest in low-risk investments that would provide a safe cash flow but to invest in high-risk, higher-



profit assets that increase their share value instead of the creditors. Froot *et al.*, (1993) states that companies which do not hedge their cash-flows might have to underinvest in states where they need external financing, but in which the cost of capital raised is higher than the return on their investment opportunities. That is, underinvestment situations positively influence the hedging of financial risk.

Economies of scale, in microeconomics, refer to the cost advantages that an enterprise obtains due to expansion. The study shows that firms that are larger exhibit a higher propensity to use derivatives; larger firms are more likely to hedge than smaller firms, indicating that economies of scale allow larger firms to hedge at lower costs (Bartram, Brown and Fehle, 2009). Foreign exposure is the change in the present value of the firm, which results from any change in future operating cash flows caused by unexpected changes in exchange rates and foreign engagements. Foreign exposure is commonly used capture foreign exchange risk and instrumental hedging is in many situations the most feasible tool when dealing with currency risk. Leal (2006) established that foreign exposure has a substantial positive impact on hedging.

## **2.7 Research Gaps**

Existing hedging theories segregate determinants of hedging into a number of theories. To begin with, firms value maximization theory that states that firms' hedge to increase their value. Secondly, agency theory asserts that management acts in their best interest owing to the separation of ownership and control and shun hedging as it lowers their perk (Faff & Nguyen, 2002). Third, stakeholders' theory states that the more sensitive a

company's value is to financial distress, the higher the motivation for hedging. Forth, new institutional economics theory state that hedging may be determined by institutions or accepted practice within a market or industry.

In line with these theories, many studies have been done on determinants of hedging (Haushalter, 2000, Graham & Rogers, 2002, El-Masry, 2003, Bartram, Brown & Fehle, 2003, Aabo, 2006 and Rossi, 2007). These studies found that hedging of firms is determined by firm size, foreign involvement and debt ratio (Aabo, 2006), financial distress, underinvestment (Haushalter, 2000 and Hagelin, 2003), country specific factors such as economic size, stage of development and legal origin (Bartram, Brown & Fehle, 2003). However, these findings are varied with some contradicting the other. Moreover, most of them have failed to determine which theories are supported by empirical observation of corporate hedging and which ones are not.

In Kenya very few studies have been done on derivative use or determinants of hedging. Mora (2010) studied the hedging practices adopted by Kenya Airways Limited (KQ) and established that KQ use of forwards and futures has been able to effectively manage fuel price risks. This study seeks to fill this gap by establishing how financial distress, underinvestment, foreign exposure, economies of scale and managerial risk aversion determine hedging of financial risks in non-financial firms.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter presents the methods and processes that were followed in conducting the study. This section outlined the study's research design and philosophy, target population and study site, the empirical model, definition and measurement of variables, data collection instrumentation, testing for validity and reliability, data collection procedure and methods of data analysis and presentation of results.

#### **3.2 Research Design**

A research design is a plan that guides the study in the process of collecting, analysing and interpreting observations. Additionally, research design is referred to as the study's blueprint for the methods and instruments used to gather information and to evaluate it, in order to respond to the research questions of the study (Eriksson & Kovalainen 2008). The study adopted a descriptive research design. Descriptive research answers research questions; who, what, where, when and how (Saunders, Lewis & Thornhill, 2009). In this study, descriptive approach achieved this by describing the data and characteristics about the population of phenomenon under study; hedging of financial risks. That is, it was used to find out the current state of the hedging practices of non-financial firms listed at the NSE, their level of involvement in financial risk hedging and what influenced such decisions.

Descriptive research design has been used in other studies like Kedia and Mozumdar (2002) in analysis of role of foreign currency debt plays in the hedging activities of US non-financial firms while Afza and Alam (2011) used descriptive research design to determine the factors affecting firms hedging policies of both foreign currency and interest rate by non-financial firms listed on Karachi Stock Exchange. Abor (2005) used descriptive research design to investigate how Ghanaian non-financial firms hedged foreign exchange risk. In view of the above definitions, descriptions and strengths, descriptive survey is the most appropriate design for this study. Descriptive research design was therefore utilized as it enabled the study to examine the determinants of hedging practices among listed non finance firms in kenya.

### **3.3 Research Philosophy**

Research philosophy is a belief about the way in which data about a phenomenon should be gathered, analyzed and used. The study was guided epistemology (what is known to be true) as opposed to doxology (what is believed to be true) research philosophy. Epistemology was adopted because the determinants of hedging practices among non finance are known to be true as established in empirical review. Two major research philosophies have been identified namely positivist and interpretivist (Galliers1991). This study adopted a positivist research paradigm which is an epistemological position. Positivists believe that reality is stable and can be observed and described from an objective viewpoint (Levin 1988). They contend that phenomena should be isolated and that observations should be repeatable. This often involves manipulation of reality with variations in only a single independent variable so as to identify regularities in, and to

form relationships between, some of the constituent elements of the social world. Positivists hold that anything that can be perceived through the senses is real (Sarantakos 2005) and so reality is an externality which exists independently of human thought and perception.

### **3.4 Population**

A population is generally a large collection of individuals or objects that is the main focus of a scientific query and to whose benefit the study is done (Castillo, 2009). Kitchenham and Pflieger (2002) state that target population is a well-defined collection of individuals or objects known to have similar characteristics and usually have a common, binding characteristic or trait which are taken for measurements. The target population for this study was all the thirty nine (39) non-financial firms listed at the NSE by the end of the years 2011. The respondents, also known as the unit of analysis, were the 39 finance managers from each of the 39 firms. Sample frame is a list that includes every member of the population from which a sample is to be taken (Nicholas, 2011). The sampling frame consisted of the 39 non-financial firms listed at the NSE in the year 2011.

### **3.5 Sample Size and Sampling Technique**

Since the accessible population was the financial managers and annual reports for 39 non-financial firms listed at the NSE, this study used the entire population as the sample. Accessible population of finance managers was used since they are knowledgeable about hedging practices and are directly involved in advising firms on hedging and derivative

issues. Mark (2009) further states that a census eliminates sampling error and provides data on all the individuals in the population. The number of respondents were the 39 financial managers, the unit of analysis, assuming one financial manager per firm. Therefore, the summary of respondents’ sectors was as indicated in Table 3.1. The approach presented, adopted by Karol (2008), Faff and Nguyen (2002) and Berkman and Bradbury (1996), is based on the premise that banks, insurance companies and other financial sector enterprises purchase and issue derivative instruments not only for hedging but also for trading purposes.

**Table 3.1: Summary of Respondents’ sectors (NSE, 2011)**

<b>Sector</b>	<b>Target Population</b>	<b>Percentage</b>
Agricultural	7	17.9%
Trading	18	46.2%
Manufacturing	14	35.9%
<b>Total</b>	<b>39</b>	<b>100%</b>

### **3.6 Research Instruments**

The study used both primary and secondary data sources. Primary data is new data obtained from the sample of the research project while secondary data already exists, data intended for other purposes other than the study itself (Collis and Hussey, 2003). Primary data was collected through semi-structured questionnaires which were sent to corporate finance managers while secondary data was collected from the annual report various listed non finance banks. Judge, (2002) on his study on determinants of hedging using derivatives by UK non-financial firms used both primary and secondary data. Primary

data was through a questionnaire sent to corporate treasurers and secondary data collected from annual reports published in 1995.

The study collected quantitative and qualitative data through both closed-ended and open-ended questions. The open-ended questions sought to encourage respondents to share as much information as possible in an unconstrained manner. The closed-ended questions, on the other hand, involved questions that could be answered by simply checking a box or circling the proper response from a set provided (Fowler, 1993). Abor (2005) on his study of Ghanaian firms hedging against foreign exchange risk used both closed-ended and open-ended questions.

### **3.6.1 Data Collection Procedure**

Data collection is the gathering of information to serve or prove some facts (Kombo & Tromp, 2009). The questionnaire was self-administered to the respondents. Secondary data was collected from published annual financial statements of 2011. Chang and Ho (2006) used a self-administered, semi-structured questionnaire in their study on organizational factors to the effectiveness of implementing information security management. The mail survey has been criticized for nonresponse bias. If persons who respond differ substantially from those who do not, the results do not directly allow one to say how the entire sample would have responded (Armstrong & Overton, 1977).

There are three methods for estimating nonresponse: comparisons with known values for the population, subjective estimates, and extrapolation. This study adopted extrapolation methods which are based on the assumption that subjects who respond less readily

(answering later or as requiring more prodding to answer) are more like non-respondents. The most common type of extrapolation is carried over successive waves of a questionnaire, where wave refers to the response generated by a stimulus, e.g., a follow-up postcard. Berezina, et al., (2012) in their study on the impact of information security breach on hotel guest perception of service quality, satisfaction, revisit intentions and word-of-mouth used extrapolation methods for estimating nonresponse bias.

### **3.7 Pilot Test**

Kombo and Tromp (2009) describe a pilot test as a replica and rehearsal of the main survey. Dawson (2002) states that pilot testing assists in seeing if the questionnaire will obtain the required results. Before actual data collection, a pilot study was conducted on 15 non-financial firms from Kenya Private Sector Alliance (KEPSA) who are not listed at the NSE. This number was appropriate for pilot testing as supported by Mugenda (2009) that states that a sample size of 10 respondents is adequate for pilot study. The selection rationale was based on the firms having same characteristics as their listed counterparts. The pre-testing of the questionnaire provided an opportunity to refine the questionnaire by revealing errors in the individual questions, sequence and design and see how the questionnaire would perform under actual conditions (Churchill & Iacobucci, 2002).

The clarity of the instrument's items was enhanced so as to enhance the instrument's validity and reliability. The pilot study helped to familiarize with administration



procedures of the instrument as well as identifying items that require modification. The results enabled correction of inconsistencies arising from the instruments. Kapitsinas (2008) used pilot on his study on the usage and practice of derivative instruments among the 62 Greece non-financial firms listed in the year of 2005.

### **3.7.1 Reliability**

Reliability is the extent to which a measure, procedure or instrument yields the same result on repeated trials (Eriksson & Kovalainen, 2008). The study used internal consistency method to measure reliability. Internal consistency was tested using Cronbach's Alpha. Cronbach's Alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. A high value of alpha is often used as evidence that the items measure an underlying (or latent) construct (Warmbrod, 2001). Marczyk, DeMatteo and Festinger (2004) stated that to ensure reliability, a predetermined threshold of 0.7 is needed. That is, values above 0.7 indicated presence of reliability while values below signified lack of reliability. The Cronbach statistics for all the four independent variables and one dependent variable revealed Cronbach statistics of over 0.7, which indicated internal consistency/reliability. Nzuki's (2010) study on managing price risk in oil Industry used internal consistency method or measuring reliability. Chiorean, Donohoe and Sougiannis (2012) used similar method.

### **3.7.2 Validity**

Validity is the degree by which the sample of test items represents the content the test is designed to measure (Borg & Gall, 1989). There are two forms of validity, namely

internal and external validity. Internal validity is referred to as a causal relationship between the independent and dependent variable. The variables we included in our study are well supported by previous research and we conduct causality tests to support this relationship. Therefore we believe that our study has a high internal validity. External validity concerns how well our research results can be generalized to other situations (Bryman & Bell, 2007). Content validity which was employed by this study is a measure of the degree to which data collected using a particular instrument represented a specific domain or content of a particular concept. Ndosu, (2012) used content validity in his study of the relationship between use of financial derivatives and fuel costs in Kenya Airways. Tijani and Mathias (2013) on their study of derivatives and financial risk management in Nigeria non-financial firms used content validity.

### **3.8 Data Analysis and Presentation**

After data collection, the filled-in and returned questionnaires were edited for completeness, coded and entries made into Statistical Package for Social Sciences (SPSS version 20). Coding consisted of technical procedures where symbols, which are normally numerals, were given to the raw data in order to transform it into an easily tabulated and counted format (Churchill and Iacobucci, 2002). It assisted in reducing the replies to a few categories containing information required for analysis. Thus, codes were given to each individual response. This ensured that the data was accurate, consistent with other information, uniformly entered, complete and arranged to simplify coding and tabulation. With data entry, the data collected was captured and stored.

The dataset was then subjected to a verification process to verify whether the captured data correlated with the data-captured into SPSS. Descriptive statistics were conducted using SPSS version 20. Various statistical and analytical approaches were used namely; descriptive and inferential statistics. The study used descriptive statistics transformation of raw data into an easily comprehensible and interpretable form by calculating frequency and percentage distribution (Zikmund, 2011). Mean and standard deviations were be used as measures of central tendencies and dispersion, respectively.

The regression was used to determine the relationship between independent and dependent variables. In this case, the dependent variable - being to hedge or not to - was a binary variable with the variables 0 or 1. Thus, OLS regression couldn't have been compatible (Stock & Watson, 2012). Therefore, study used logistic (logit) regression, which is capable of handling a binary dependent variable, creating a logistic rather than a linear curve. Binary approach has been used most often in risk management research; Afza and Alam (2011), Fauver and Naranjo (2010), Karol (2008), Graham and Rogers (2002) and Mian (1999). For instance, Afza and Alam (2011) used Logit model in determining the factors affecting firms hedging policies of both foreign currency and interest rate derivative instruments of 105 non-financial firms listed on Karachi Stock Exchange. Dummy variable separating hedging firms from non-hedging firms used by studies such as Fauver and Naranjo (2010) considered logistic regression where 0 represents non-hedging firms, and 1 represents hedging firms. The advantage of the method is that it gives an easily available, comparable method of measuring derivative use. Hagelin (2003) also used logit regressions to investigate the determinants of foreign

exchange risk management practice, in particular the usage of foreign exchange derivatives.

This led to the following regression function:

$$\text{Equation (1): } Y_i = \frac{1}{1 + e^{(-REG)}} + u_i$$

$$\text{Equation 2: } REG = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e$$

Where  $REG = \beta_0 + \beta_1 \text{Financial Distress} + \beta_2 \text{Underinvestment cost} + \beta_3 \text{Economies of scale} + \beta_4 \text{Foreign Exposure} + \beta_5 \text{Managerial Risk Aversion}$

$Y_i$  represents the hedging dummy, which can produce a predicted value between 0 and 1.

The betas represent the increase or decrease in likelihood that  $Y = 1$  for each variable. In other words, an increase in the variable  $Y$  of 1 is more (or less) likely for each change in the independent variable in question.

Since this is a logistic regression, the calculation of the betas in the equation represent the following:

$\beta_1$  = The marginal impact on hedging dummy resulting from change in financial distress, keeping all other factors constant.

$\beta_2$  = The marginal impact on hedging dummy resulting from change underinvestment costs, keeping all other factors constant.

$\beta_3$  = The marginal impact on hedging dummy resulting from change in Economies of scale, keeping all other factors constant.

$\beta_4$  = The marginal impact on hedging dummy resulting from change in foreign exposure, keeping all other factors constant.

$\beta_5$  = The marginal impact on hedging dummy resulting from change in Managerial Risk Aversion, keeping all other factors constant.

### **3.8.1 Evaluations of the Logistic Regression Model**

To assess the soundness of a logistic regression model one must attend to evaluate; overall model evaluation, statistical tests of individual predictors, goodness-of-fit statistics, validations of predicted probabilities and odd ratios. The adequacy of the model (overall model evaluation) is checked using the Omnibus Tests of Model (a test of the full model against a constant (intercept) only model. A logistic model is said to provide a better fit to the data if it demonstrates an improvement over the intercept-only model (also called the null model). An intercept-only model serves as a good baseline because it contains no predictors (Peng, Lee & Ingersoll, 2002).

The statistical significance of individual regression coefficients (i.e.,  $\beta$ s) is tested using the Wald chi-square statistic. The null hypothesis underlying the overall model states that all  $\beta$ s equal zero. A rejection of this null hypothesis implies that at least one  $\beta$  does not equal zero in the population, which means that the logistic regression equation

predicts the probability of the outcome better than the mean of the dependent variable Y (Peng, Lee & Ingersoll, 2002).

The study conducted an Exploratory Factor Analysis (EFA) to determine the sampling adequacy of the data collected. EFA determine the appropriate number of common factors and ascertain which measured variables are reasonable indicators of the various latent dimensions (using the size and differential magnitude of factor loadings) (Williams, Brown & Onsman, 2012). EFA enabled identification of factors that favorably loads all correlated with others factors measuring independent variables.

Goodness-of-fit statistics assess the fit of a logistic model against actual outcomes. The logistic regression model validation can be assessed through the Hosmer-Lemeshow statistic which is inferential goodness-of-fit test (Thanh, Cuong, Dung & Chieu, 2010) and Nagelkerke R-square, a descriptive measure of goodness-of-fit (Field, 2009). The Hosmer-Lemeshow statistic tests the null hypothesis that there is a linear relationship between the predictor variables and the log odds of the criterion variable. A chi-square statistic is computed comparing the observed frequencies with those expected under the linear model. A non-significant chi-square (with p-value greater than 0.05) indicates that the data fit the model well. The degree to which predicted probabilities agree with actual outcomes is expressed as either a measure of association or a classification table. Peng, Lee and Ingersoll (2002), the classification table is most appropriate when classification is a stated goal of the analysis; otherwise it should only supplement more rigorous methods of assessment of fit.

More crucial to the interpretation of logistic regression is the value of the odds ratio ( $Exp(B)$ ), which is an indicator of the change in odds resulting from a unit change in the predictor. The odd ratio is similar to the  $\beta$  coefficient in logistic regression but easier to understand (because it does not require a logarithmic transformation). Olawale and Akinwumi (2010), when reporting the results of a logistic regression analysis, the estimated odd ratios for the regression coefficients, and associated p-values should be presented. The odds of an event occurring are defined as the probability of an event occurring divided by the probability of that event not occurring (Field, 2009). It estimates the change in the odds of membership in the target group for a one unit increase in the predictor. It is calculated by using the regression coefficient of the predictor as the exponent.

### **3.9 Ethical consideration**

The researcher first sought the permission to carry out the study from the top management of the 39 non finance listed firms by presenting letter of introduction from post graduate school of the university. The researcher guaranteed the respondents that the information being collected would be for the purpose of the study only and would be treated with utmost confidentiality it deserves. The researcher also sought to get full cooperation of the respondents for successful data collection. The respondents were also not be required to write their names or any other information that can be specifically identified with a person directly.

## **CHAPTER FOUR**

### **RESULTS AND DISCUSSION**

#### **4.1 Introduction**

The purpose of the study was to establish the determinants of financial risks hedging practices by non-financial firms listed on the Nairobi Securities Exchange. The analysis presented in this chapter involved the use of descriptive analysis where frequency, percentages, mean and standard deviation were considered. Diagnostic tests and test of assumptions were conducted to measure the suitability of the variables for subsequent inferential analysis. Univariate and multivariate inferential analysis were conducted to test the relationship between dependent (hedging of financial risks) and independent variables (financial distress, underinvestment cost, economies of scale, foreign exposure and managerial risk aversion).

#### **4.2 Response Rate**

Semi-structured questionnaires were distributed to 39 firms listed on NSE. Out of these, 37 questionnaires were returned making a response rate of 94.9%. This fell within Bryman & Bell (2007) prescribed significant response rate for statistical analysis, established at a minimal value of 50%. Fincham (2008) stated that a low response rate can give rise to sampling bias while higher response rates assure more accurate survey results and therefore recommended a minimal response rate of 60%. Only 2 questionnaires were not returned signifying a 5.1% of the total survey. Table 4.1 summarizes the response rate in this study.



**Table 4.1: Response Rate**

<b>Questionnaires</b>	<b>Frequency</b>	<b>Percentage</b>
Filled in Questionnaires	37	94.9
Unfilled Questionnaires	2	5.1
<b>Total</b>	<b>39</b>	<b>100.0</b>

#### **4.2.1 Reliability of Data Collection Instruments**

The study conducted a reliability test to determine the internal consistency of the data obtained. Internal consistency method was preferred as it measures whether several items that propose to measure the same general construct produce similar scores thus a preferred technique of measuring reliability (Saunders, Lewis & Thornhill, 2009). Table 4.2 shows that the scales were reliable as they surpassed a Cronbach Alpha threshold of 0.7. The construct of ‘hedging practices had an Alpha value of 0.838; ‘financial distress’ had an Alpha value of 0.758; ‘underinvestment cost’ had an Alpha value of 0.862; and, ‘economies of scale’ had an Alpha value of 0.906, foreign exposure had a reported Alpha value of 0.896 while managerial risk aversion had a Cronbach alpha of 0.875. Marczyk, DeMatteo and Festinger (2004) states that Cronbach Alpha value Of 0.7 is the threshold for determining reliability. Nunnaly (1978) has indicated 0.7 to be an acceptable reliability coefficient. Kline (2000) states a scale of  $0.7 \leq \alpha < 0.9$  is good and a scale of  $0.6 \leq \alpha < 0.7$  is acceptable.

**Table 4.2: Reliability Test**

	<b>Cronbach's Alpha</b>	<b>Cronbach's Alpha Based on Standardized Items</b>	<b>N of Items</b>
Hedging Practices	.838	.823	10
Financial Distress	.758	.721	6
Under investment Cost	.862	.851	4
Economies of Scale	.906	.917	4
Foreign Exposure	.896	.888	4
Managerial Risk Aversion	.875	.866	4

### **4.3 Firms Demographics**

The subsectors were in three categories of Agricultural, Trading and manufacturing as shown in table 4.3. In all, three industries were represented including, agriculture representing 18.9 percent of valid respondents, trading (43.2 percent) and manufacturing (37.9percent).Majority of the firms belonged to manufacturing which dependent on importation of spare parts and other parts hence they have an active international operations hence need for hedging of risks .There were also trading companies which majorly participate in resale business. They too need hedging practices to handle risks associated with their operations especially on international operations and finally agricultural firms especially the export oriented horticultural agricultural firms needs a vibrant finance department that can advice the firms on appropriate hedging practices to help manage the expected risks in the international trading activities.

**Table 4.3: Subsector**

<b>Sector</b>	<b>Frequency</b>	<b>Percentage</b>
Agricultural	7	18.9
Trading	16	43.2
Manufacturing	14	37.9
<b>Total</b>	<b>37</b>	<b>100</b>

#### **4.3.1 Financial Risks Exposure**

Financial risk exposure was measured using the ordinal scale, specifically Likert scale. The results were expressed as percentages, as shown in table 4.4. The results showed that majority (65.3%) of the firms highly affected by foreign exchange risk, 18.5% of the firms were affected to a low extent while a few (15.8%) were moderately affected. On interest rates risks, majority (48.4%) of the firms were moderately affected, 43.5 % indicated were highly affected while a few (8.1%) were lowly affected. In regard to commodity price risk , it was established that majority (51.4%) of the firms were moderately affected by the commodity price risks in their operations, 27% claimed to be less affected by the commodity prices risks, a few (21.6%) said their operations were affected to a large extent.

Thus, as aforementioned, majority of the non-financial firms listed at NSE are exposed to foreign exchange risks. Similarly, Karp (2009) established that Kenya is a net importer and foreign exchange fluctuation affects firms' pricing and production cost strategies. Turana (2011) avers that Kenyan shilling exchange rate is volatile against major currencies exposing firms to exchange risks as was the case in 2011. This could

explain why hedging against foreign currency exposure is increasingly becoming important for non-financial firms listed on the NSE because the volatile exchange rates can easily swing profit into loss and vice versa as companies settle financing and purchase obligations incurred in various hard currencies. Hedging of interest rates risk is important for non-financial firms listed on NSE. Interest rate risk impacts on the value of firms through changes in cash flows generated by operations, which arise due to interest rate direct effect on the cost of capital. In addition, there may be indirect effects of interest rate risk on the competitive position of firms, impacting also on their expected cash flows. Finally, interest rate risk may influence firms' value due to changes in the value of their financial assets and liabilities.

**Table 4.4: Financial Risk Exposure**

<b>Financial Exposure</b>	<b>Risk</b>	<b>Very low</b>	<b>Low</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>	<b>Mean</b>	<b>STDEV</b>
Foreign Exchange Risk		5.3	13.2	15.8	60.5	5.3	3.48	0.962
Interest rate risk		0.0	8.1	48.4	43.5	0.0	3.24	0.664
Commodity price risk		0.0	27.0	51.4	16.2	5.4	3.16	1.04

#### **4.4 Correlation Analysis of Study Variables**

Correlation among the independent variables is illustrated by the correlations matrix in Table 4.5. Correlation is often used to explore the relationship among a group of variables (Pallant, 2010), in turn helps in testing for multicollinearity. When the correlation values are not close to 1 or -1, it is an indication that the factors are sufficiently different measures of separate variables (Farndale, Hope-Hailey & Kelliher, 2010). It is also an indication that the variables are not multicollinear. Absence of multicollinearity allows the study to utilize all the independent variables.

Table 4.6 shows that the lowest correlation in this study was between economies of scale and managerial risk aversion ( $r=0.217$ ,  $p<0.01$ ). The highest correlation was between under-investment and managerial risk aversion ( $r=0.851$ ,  $p<0.01$ ). A correlation of above 0.90 is a strong indication that the variables may be measuring the same thing (Castillo, 2009). The fact that all the correlations were less than 0.90 was an indication that the factors were sufficiently different measures of separate variables, and consequently, this study utilized all the variables

**Table 4.5: Correlations of the Study Variables**

<b>Variables</b>	<b>Financial Distress</b>	<b>Under-Investment</b>	<b>Economies of Scale</b>	<b>Foreign Exposure</b>	<b>Managerial Risk Aversion</b>
Financial Distress	1	.764**	.693**	.358**	.663**
Under-Investment	.764**	1	.807**	.237**	.851**
Economies of Scale	.693**	.807**	1	.660**	.217**
Foreign Exposure	.358**	.237**	.660**	1	.795**
Managerial Risk Aversion	.663**	.851**	.217**	.795**	1

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

#### **4.5 Descriptive and Qualitative Analysis of the Study Variables**

The section provides the descriptive analysis of study variables. Specifically, the study variables were financial distress, underinvestment cost, economies of scale, foreign exposure, and managerial risk aversion as independent variables and hedging practices as dependent variable.

#### **4.5.1 Financial Distress amongst Non-Financial Firms Listed at NSE**

The study sought to establish the descriptive results of financial distress amongst non-financial firms listed on NSE. The financial distress was operationalized into: liquidity, leverage, profitability and interest rate cover.

##### **Liquidity**

The liquidity of non-financial firms was measured using the Likert scale and the results expressed as percentages, as shown in in Table 4.6. The results revealed that majority (54.1%) of the firms indicated moderate of liquidity, 24.3 % indicated that the liquidity of the firm was low while a few (21.6%) indicated high liquidity. The secondary data on liquidity was calculated using quick ratio and current ratio as shown in appendix V. The quick ratio has a mean of 0.68 and standard deviation of 0.64 while current ratio has a mean of 0.87 and standard deviation of 0.76. This shows that on average, non-financial firms listed on NSE faced moderate of liquidity.

The findings agree with those of Cui and Vaja (2008), Judge (2006), Lel (2006) which note that majority of Non-financial firms are moderately liquidity hence probability of being financially distressed. Bartram, Brown and Fehle (2009) found that firms hedge to reduce their liquidity risks, thus placing them in a position to meet their financial obligations and reduce bankruptcy costs. They further established that firms with less liquidity are more likely to hedge. Gay, Lin and Smith (2011) had examined the relationship between the use of derivatives and the cost of equity. They found that quick ratio is negatively correlated with hedging, because high liquid firms have less

significant expected cost of financial distress hence less motivation to hedge. The moderate liquidity experienced by Non-financial firms listed on NSE can explain the moderate incentives to take part in hedging activities. The moderate liquidity levels which result to a moderate probability of financial distress explains the under hedging noted by Nzuki (2010) who established that derivatives usage in Kenya oil companies is below the optimal level; 31 % to 60% against an optimal of 93%.

**Table 4.6: Liquidity**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Negative	3	8.1
Low	6	16.2
Moderate	20	54.1
High	7	18.9
Very High	1	2.7
<b>Total</b>	<b>37</b>	<b>100</b>

### **Leverage**

The leverage of non-financial firms was measured using the Likert scale and the results, expressed as percentages, as shown in in table 4.7. The results revealed that majority (59.5%) of the firms had high leverage, 24.3 % indicated that their leverage were moderate while a few (16.2%) indicated leverage. The secondary data on leverage was calculated using gearing ratio as shown in appendix V and revealed a high leverage with a mean value of 31.98 and standard deviation of 47.02.

Due to the high leverage, non-financial firms listed on NSE are expected to turn to hedging to reduce cash flow volatility hence ensuring their debt obligations are met. Besides hedging to reduce the probability of lower tail events, hedging also helps non-

financial firms listed on the NSE to enhance the firm's debt capacity and ultimately, the firm's value. This agrees with Wang and Fan (2011) in their research to determine the corporate engaged in hedging activities in the oil and gas industry found out that the leveraged had a positive relationship and significant to the use of derivative. Hedging has a useful effect for higher leverage of firms whereby it can stabilize the internally cash flow and reduce financial distress costs and other cost that are associated with the variability of cash flow.

**Table 4.7: Leverage**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Very Low	2	5.4
Low	4	10.8
Moderate	9	24.3
High	15	40.6
Very High	7	18.9
<b>Total</b>	<b>37</b>	<b>100</b>

### **Profitability**

The study conducted analysis of profitability of the non-financial firms. The results in the table 4.8 indicate that majority (51.4%) of the non-financial firms had high profitability while 27.0 % indicated very moderate profitability. On the contrary, only 21.6% of the firms indicated that they had low profitability or made loss. The secondary data on profitability was calculated using return on equity and the result shown appendix V reveals high profitability with a mean value of 7.9 and standard deviation of 6.8.

The study reveals that some non-financial firms listed on NSE reported high profits which means they have less incentives to engage in hedging. In other words, high



profitability of non-financial firms listed on NSE are exposed to a lower probability of financial distress. These findings concur with those of Bartram, Brown and Fehle (2009) who conducted similar studies and concluded that firms with higher profitability have lower financial distress costs and are less likely to hedge. Judge (2006) and Lel (2006) also reported similar findings that the higher the probability, the less the need of using instrumental hedging tools.

**Table 4.8: Profitability**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Loss	3	8.1
Low	5	13.5
Moderate	10	27.0
High	17	46.0
Very High	2	5.4
<b>Total</b>	<b>37</b>	<b>100</b>

### **Interest Coverage**

The interest coverage of non-financial firms was measured using the Likert scale and the results, expressed as percentages, as shown in in table 4.9. The results revealed that majority (45.9%) of the firms had low interest coverage position, 29.8 % indicated that they had high interest coverage while a few (24.3%) indicated moderate interest coverage. The secondary data on interest rate coverage was calculated using interest rate coverage ratio. Appendix V shows the result of the ratio with a mean of 16.96 and standard deviation of 26.48.

These findings imply that non-financials firms listed on NSE have difficulties in meeting their interest payments in the course of ongoing business. This can be explained by the high gearing exhibited by the firms. This means that the firms are likely to suffer heavily in case of any volatility in earnings hence highly distressed. This further means that non-financial firms are more likely to hedge to avoid unforeseen volatility in their earnings. Judge, 2006 measured financial distress through interest coverage (IC) ratio. He found out firms with higher IC ratio had a lower probability of going bankrupt, hence a negative relationship between this ratio and hedging.

**Table 4.9: Interest Coverage**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Very Low	6	16.2
Low	11	29.7
Moderate	9	24.3
High	6	16.2
Very High	5	13.6
<b>Total</b>	<b>37</b>	<b>100</b>

#### **4.5.2 Underinvestment Cost amongst Non-Financial Firms Listed at NSE**

This section describes the extent of underinvestment costs in non-financial firms. Underinvestment cost was operationalized into: Research and development expenses to total sales, Capital expenditure to total assets, price earnings ratio and market vs book value analysis.

## **Research and Development Expenses to Total Sales**

The study conducted an assessment of the proportion of research and development expenses to total sales. The findings in table 4.10 indicate that majority (59.5%) of the non-financial firms proportion of research and development expenses to total sales was between 1% and 5%. The findings also showed that 32.4% of the non-financial firms did incur between 6% and 10% while only 10.50% of the non-financial firms surveyed had research and development expenses between 11% and 15% of total sales. None of the firms had research and development expenses at 0% or above 15% of the total sales. The secondary data on Research and development expenditure to total sales was calculated and appendix V shows the result of the ratio with a mean of 3.56 and standard deviation of 16.66.

The results reveal that most of non-financial firms listed on NSE have incurred noteworthy expenditure in research and development. The spending predicts future growth by these firms either through developing new products or processes to improve and expand their operations. These findings conquer with those of Lei (2006) who stated that research and development (R&D) expense reflect growth prospects of a firm which is directly proportional to underinvestment. Lin and Smith (2007) also found that derivatives users have greater R&D expenditures as compared to non-users.

Having significant expenses on research and development implies more investment opportunities. An important key for supporting good investments is internal generation of sufficient cash to fund those investments. When firms do not generate sufficient cash

flow, they tend to cut investments below the optimal level because of costly external financing. Internally generated cash flow, which is critical to the investment process, can be disrupted by external factors such as movements in exchange rates, interest rates, or commodity prices. Non-financial firms listed on NSE are expected to engage in more hedging activity to ensure sufficient cash flow is available to make value enhancing investments.

**Table 4.10: Research and Development Expenses to Total Sales**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
None	0	0.0
1 – 5%	22	59.5
6 –10%	12	32.4
11 – 15%	3	8.1
More than 15%	0	0.0
<b>Total</b>	<b>37</b>	<b>100</b>

#### **Capital Expenditure to Total Assets**

The study conducted an analysis of the proportion of company’s capital expenditure to total asset of non-financial firms listed on NSE. The findings in table 4:11 revealed that majority (48.6%) of the non-financial firms capital expenditure was between 1% and 5% of the total assets. Firms that indicated that their capital expenditure was between 6% and 10% of the total assets were 46.0%. A combined 94.6% of the firms indicated that their capital expenditure to total asset was less than 10%. Only 5.4% of the firms indicated that their capital expenditure to total assets was between 11% and 15%. None of the firms reported to have capital expenditure above 15% of the total assets. The

secondary data on capital expenditure to total asset was calculated. Appendix V shows the result of the ratio with a mean of 0.08 and standard deviation of 0.17.

The findings reveal high growth opportunities and investment needs among non-financials firms listed on NSE. Access to capital to finance these needs is critical and the risk for underinvestment cost is increased. Thus these firms will be more eager to engage in risk management activities. In fear of underinvestment issues, creditors will demand higher interest rates or debt covenants. Hedging can mitigate these agency costs by decreasing the riskiness of projects. The firms listed on NSE that engage in hedging can therefore increase their debt levels without increasing the chance of encountering underinvestment costs.

The findings agree with Adam and Fernando (2006) who stated that underinvestment problem is more severe for firms with significant growth and investment opportunities. Cui and Vaja (2008) found that firms with higher investment opportunities tend to hedge more. By hedging, firms may reduce cash flow volatility and the need for external funding. Hedging can thereby mitigate potential underinvestment and cash flow problems (Morellec and Smith, 2007).

**Table 4.11: Capital Expenditure to Total Assets**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
None	0	0.0
1– 5%	18	48.6
6 –10%	17	46.0
11– 15%	2	5.4
More than 15%	0	0.0
<b>Total</b>	<b>37</b>	<b>100</b>

### **Price Earnings Ratio**

The study conducted an analysis of the Price Earnings ratio to test the level of underinvestment cost among non-financial firms. The results in table 4.12 indicate that majority (56.7%) had their price earnings ratio below 10%. Further the results showed 24.4% of the firms reported price earnings ratio of above 20% while only 18.9% of the non-financial firms had a price earnings ratio between 11 and 20%. In order to further corroborate the findings from the primary data, secondary data on price earnings ratio was calculated with result of the ratio with a mean of 3.59 and standard deviation of 1.64.

The P/E ratio is as a reflection of the market's optimism on non-financial firms listed on NSE growth prospects. Higher P/E ratios are typically associated with firms with higher growth prospects. Berkman and Bradbury (1996) use the earnings price ratio in their study of derivatives use by New Zealand firms found out that firms with high P/E ratio hedged more. Firms with High P/E ratio are mostly exposed to possible underinvestment problems as a result of the high growth opportunities and low levels of internal cash (Gay and Nam, 1998). In fear of underinvestment issues, creditors will demand higher interest rates or debt covenants. Risk management can mitigate these agency costs by decreasing the riskiness of projects. Non-financial Firms listed on the NSE engage in hedging to increase their debt levels without increasing the chance of encountering underinvestment cost.

**Table 4.12: Price Earnings Ratio**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Below 0	5	13.5
1 – 10%	16	43.2
11– 20%	7	18.9
21 – 30%	6	16.2
More than 30%	3	8.2
<b>Total</b>	<b>37</b>	<b>100</b>

### **Market to Book Value**

The study also conducted assessment of the current market value of the non-financial firms listed on the NSE. The findings in table 4.13 revealed that majority (45.9%) of the firms are overpriced by the market. The findings further revealed that 29.7% of the firms are underpriced by the market while 24.4% revealed firms had the market and book value at the same level. The secondary data on market to book ratio was calculated, the result of the ratio with a mean of 4.16 and standard deviation of 11.14.

The market-to-book-value ratio measures the likelihood that a firm will have growth opportunities. This is because the market value represents both the values of a firm's assets in place and future growth opportunities. Book value captures the value of assets in place. Thus, the ratio provides a relative measure of a firm's growth opportunities. In relation to non-financial firms listed on NSE, the results reveal majority had their value overpriced which means a high likelihood of growth opportunities thus expected to hedge. This is in line with the research development and capital expenditure proxies of

underinvestment cost. Using a market-to-book-value ratio to proxy for a firm’s future investment opportunities, Mian (1999) finds a positive association between hedging and the market-to-book ratio.

**Table 4.13: Current Market Value Analysis**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Highly Underpriced	3	8.1
Underpriced	8	21.6
Market and Book Value are Equal	9	24.4
Overpriced	13	35.1
Highly Overpriced	4	10.8
<b>Total</b>	<b>37</b>	<b>100</b>

#### **4.5.3 Economies of Scale amongst Non-Financial Firms Listed on the NSE**

This section presents the findings on how firms’ economies of scale influence their hedging practices. It specifically looks at firms’ average annual turnover, total asset and market value.

##### **Total Sales**

The study conducted an assessment of total sales (annual turnover) of the non-financial firms listed on NSE. Table 4.14 summarizes the results of total sales. The findings revealed that majority (40.6%) of the non-financial firms had an average total sales of between kshs 1 to 10 billion. Non-financial firms with an average total sales of kshs 11 to 100 billion were 37.8% while non-financial firms with below kshs 1 billion were 18.9% each. Only 2.7% of the non-financial firms reported to have than kshs 101 billion



to 200 billion total sales. The secondary data on total sales (Natural Log) was calculated and appendix V shows the results of the ratio with a mean of 4.75 and standard deviation of 1.36.

The findings agree with those of Khun (2007); while large firms have advantages in economies of scale in relation to information and knowledge about the implementation of a corporate risk management program and also advantages concerning transaction costs and costs in the administration of corporate risk management, small firms are faced with clear disadvantages when it comes to the realization of corporate risk management activities. Moreover, the size effect is related to several factors that make the relationship between firm size and hedging significant. Large non-financial firms listed on NSE have more human resources and access to resources needed to implement the most appropriate hedging programs solutions. Thus expected to hedge more as compared to small firms.

**Table 4.14: Total Sales**

<b>Reserve Value</b>	<b>Frequency</b>	<b>Percentage</b>
< 1 Billion	7	18.9
1 – 10 Billion	15	40.6
11– 100 Billion	14	37.8
101– 200 Billion	1	2.7
More than 200 Billion	0	0.0
<b>Total</b>	<b>37</b>	<b>100.0</b>

**Total Asset Value**

The study also conducted an analysis of total asset value of the non-financial firms listed on NSE. Table 4.15 summarizes the results of annual turnover. The findings revealed

that majority (46.0%) of the non-financial firms had total assets value of between kshs 1 and kshs 10 billion. Non-financial firms with total assets value of between kshs 11 billion and kshs 100 billion were 27.0%. Firms with less than kshs 1 billion total assets value were 16.2%, those with total assets value of between kshs 101 billion and kshs 200 billion were 8.1% and only 2.6% of the non-financial firms had a total asset value of more than kshs 200 billion. The secondary data on total assets (Natural Log) was calculated. Appendix vi shows the result of the ratio with a mean of 5.66 and standard deviation of 1.52.

Large non-financial firms listed on NSE are expected to gain more from hedging using derivative instruments. This justification emanates from the ability of larger firms to bear the higher costs, as well as the lower cost of setting up a derivative programme for risk management (Warner, 1977). This is highly plausible, given the significant manpower, monitoring needs and appropriate systems to account for marking to market requirement associated with a successful derivative programme.

**Table 4.15: Total Asset Value**

<b>Reserve Value</b>	<b>Frequency</b>	<b>Percentage</b>
< 1 Billion	6	16.2
1– 10 Billion	17	46.0
11 – 100 Billion	10	27.0
101– 200 Billion	3	8.1
More than 200 Billion	1	2.7
<b>Total</b>	<b>37</b>	<b>100.0</b>

### **Market Capitalization**

The study also conducted an analysis of market capitalization of the non-financial firms listed on NSE. The results presented in the table 4:16 show that majority (46.0%) of the non-financial firms had market capitalization of between kshs 1 and kshs 10 billion. Non-financial firms with market capitalization of between kshs 11billion and kshs 100 billion were 27.0%. Firms with less than kshs 1 billion market capitalization were 16.2%, those with market capitalization of between kshs 101 billion and kshs 200 billion were 8.1% and only 2.6% of the non-financial firms had a market capitalization of more than kshs 200 billion. The secondary data on Market capitalization (Natural Log) was calculated. Appendix V shows the result of the ratio with a mean of 6.36 and standard deviation of 1.28.

The non-financial firms listed on NSE with high market capitalizations have greater diversity of operations in countries within which they operate thus exposed to various currency especially US Dollar, Sterling Pound Euro and Japanese Yen. As such they tend to hedge these international currency exposures more than a company dominated by local operations to reduce variability of earnings. Hedging programmes require a sophisticated understanding of derivatives and appropriate risk management and accounting systems. Smaller non-financial firms listed on NSE lack in such systems and risk management.

Furthermore, the positive relationship between a firm's size and derivative usage can be justified due to the fact that smaller firms will tend to have smaller foreign currency exposure as they will be more locally orientated in terms of their sales and procurement

versus their larger multinational counterparts. In his 2006 UK study, El Masry (2006) found that larger firms are more likely to use derivatives than medium and smaller firms.

**Table 4.16: Market Capitalization**

<b>Reserve Value</b>	<b>Frequency</b>	<b>Percentage</b>
< 1 Billion	6	16.2
1 – 10 Billion	17	46.0
11– 100 Billion	10	27.0
101– 200 Billion	3	8.1
More than 200 Billion	1	2.7
<b>Total</b>	<b>37</b>	<b>100.0</b>

#### **4.5.4 Foreign Exposure Amongst Non-Financial Firms Listed at the NSE**

This section presents the findings on how foreign exposure influences firms' hedging practices. It particularly presents the proportion of companies' revenue or cost that is in foreign currency, number of firms' foreign subsidiaries, foreign debt as percentage of total debt the firm holds, and their import versus export orientation.

##### **Foreign Revenue**

The analysis of the revenue in foreign currency for non-financial firms listed on NSE revealed the results presented in the table 4:17. The results show that majority (35.1%) of the non-financial firms in NSE have consolidated revenue in foreign currency of between 21 and 40%. Non-financial firms with revenue in foreign currency of between 1 and 20% were 29.7%. The findings further show that 18.9% of the firms had between 41 and 60% of consolidated revenue in foreign currency. Firms with none revenue in foreign currency were 8.1% and only 8.1% of the firms had between 61 and 80% consolidated revenue in foreign currency. None of the firms surveyed had between 81 and 100% revenue in foreign currency. The secondary data on foreign revenue was

calculated. Appendix vi shows the result of the ratio with a mean of 36.05 and standard deviation of 31.80.

The non-financial firms listed on NSE operate internationally and are exposed to foreign exchange risk arising from sales in various currency exposures, primarily with respect to the US dollar, Sterling Pound and Euro. Foreign exchange risk arises from future commercial transactions, and recognized assets and liabilities. Much of the prior research on exchange rate hedging including Jorion (1990), Bodnar and Wong (2000), among others has measured the extent of the foreign exposure as a percentage of foreign sales to total sales. The findings agree with those of Allayannis and Ofek (2001), who noted that the extent of corporate hedging (or corporate risk management) can be determined by various exposure factors such as foreign sales and foreign trade.

**Table 4.17: Foreign Revenue**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
None (0%)	3	8.1
1 – 20%	11	29.7
21– 40%	13	35.1
41 – 60%	7	18.9
61 and above	3	8.1
<b>Total</b>	<b>37</b>	<b>100.0</b>

### **Foreign Purchase**

The study conducted analysis of the cost in foreign currency of the non-financial firms listed in NSE. The results presented in the table 4:18 show that majority (46.0%) of the non-financial firms in NSE have consolidated purchase in foreign currency of between 21 and 40%. Non-financial firms with purchase in foreign currency of between 1 and

20% were 29.70%. The findings further shows that 16.2% of the firms had between 41 and 60% of consolidated purchase in foreign currency. Firms with no costs in foreign currency were 8.1%. The secondary data on foreign purchases was calculated, appendix VI shows

Majority non-financial firms listed at the NSE are exposed to foreign exchange risk arising from purchase in various currency, primarily with respect to the US dollar, Japanese Yen and Sterling Pound. Due to exposure to foreign currencies the Non-financial firms listed on NSE have to hedge their financial exposure. The majority of non-financial firms engaged in manufacturing, source a higher percent of the raw materials from foreign countries as opposed to sales in these countries, thus a higher foreign exposure as the ratio of foreign costs to sales, which is consistent with Bartram, Brown, and Fehle (2009). Choi and Prasad (1995) found a positive relationship between foreign purchases, foreign sales and foreign exposure. If a firm has a higher proportion of its assets overseas, they may be more inclined to protect the value of the assets by using hedging to lock in future exchange rates.

**Table 4.18: Foreign Purchase**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
None (0%)	3	8.1
1 – 20%	11	29.7
21 – 40%	17	46.0
41 – 60%	6	16.2
61 and above	0	0.0
<b>Total</b>	<b>37</b>	<b>100.0</b>

**Subsidiaries Abroad**

The study also conducted an analysis of number of subsidiaries of the non-financial firms abroad. The results presented in the table 4:19 show that majority (54.1%) of the non-financial firms listed had no subsidiaries abroad. While 40.5% of the firms indicated to have between 1 and 5 subsidiaries abroad. Firms with between 6 and 10 subsidiaries were only 2. None of the firms had more than 10 subsidiaries. The secondary data on foreign operation was calculated, appendix VI shows the result of the ratio with a mean of 0.77 and standard deviation of 0.42.

Given the diversity of business lines for non-financial firms, the findings of this study indicate that over 40% of non-financial firms listed in NSE have exploited the trans-border market. This has increased the exposure to financial risks hence high desire to hedge. Butler (1997) found that the costs of hedging for smaller, less diversified firms are higher than for large multinational corporations who are likely to have established operations in different locations. These results complement the results of Mian (1999), and Allayannis and Ofek (2001) who argue that larger multinationals are able to obtain economies of scale which reduces the cost of trading financial derivatives. The findings also agree with those El Masry (2006) who found that hedging with derivative instruments is greatest among multi-site firms and international firms.



**Table 4.19: Number of Subsidiaries Abroad**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
None	20	54.1
1– 5	15	40.5
6– 10	2	5.4
11– 20	0	0.0
More than 20	0	0.0
<b>Total</b>	<b>37</b>	<b>100</b>

**Foreign Debt in Relation to Total Debt**

The study also analysed the foreign debt in relation to total debt of the non-financial firms listed in NSE. The findings in table 4.20 revealed that majority (43.2%) of the firms had 0% foreign debt to total debt percentage. While 29.7.0% of the firms had between 1 and 20% foreign debt to total debt percentage. Finally 27.1% of the firms had between 21 and 40% foreign debt to total percentage. The secondary data on foreign debt dummy was calculated. Appendix VI shows the result of the ratio with a mean of 0.65 and standard deviation of 0.31.

Non-financial firms listed on NSE are exposed to foreign loans denominated to foreign currencies especially US Dollar-denominated, Yen-denominated, Euro-denominated and Sterling pound denominated loans. As part of their asset and liability management, the Non-financial firms listed on NSE use derivatives for hedging purposes in order to reduce its exposure to foreign currency risks. This is done by engaging in currency swaps. Currency swaps relate to contracts taken out by the non-financial firms with a financial institution in which the group either receives or pays cross currency to the financial institution. In a currency swap, the non-financial firms pays a specified amount in one currency and receives a specified amount in another currency. Currency swaps

are mostly gross-settled. The findings are consistent with that of Kedia and Mozumdar (2002) who found out that foreign currency debt plays a significant role in the hedging activities of US firms especially using swaps.

**Table 4.20: Foreign Debt in relation to Total Debt**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
None (0%)	16	43.2
1 – 20%	11	29.7
21– 40%	10	27.1
41 – 60%	0	0.0
61 and above	0	0.0
<b>Total</b>	<b>37</b>	<b>100.0</b>

#### **4.5.5 Managerial Risk Aversion Amongst Non-Financial Firms Listed at the NSE**

This section presents the findings on how managerial risk aversion influence hedging practices. This includes: management ownership, structure of ownership, and Managerial Compensation.

##### **Management Ownership**

The study analysed the proportion of shares owned by managers of non-financial firms listed on NSE. The findings presented in table 4:21 revealed that majority (40.5) of the managers of non-financial firms listed on NSE have share ownership of between 1 and 5% while 35.1% had no share ownership in the firm. Firms with between 6-10 ownership were 24.3 % and no firm had ownership behold 10%.

Smith and Stulz (2003) claimed that when risk adverse managers own a large amount of firms' shares, their wealth is a function of the variance of the firm's expected profits.

They found the positive relation between managers' personal wealth invested in the firms and how much hedging the firms adopted, because managers are motivated to direct the firms to hedge rather than hedging at their own cost. The expected utility of managers of non-financial firms is affected by volatile profits, thus motivating them to hedge risks. Profits are an important measure of how investors value a stock. If a firm has volatile profits each quarter, then it is likely the stock price will also be volatile. Tufano (1996) and Schrand and Unal (1998) found evidence that hedging increases as managerial ownership increases. Managers are hired because of their specialized resources that increase firm value. In order to maximize firm value, managers should be given the proper incentives.

**Table 4.21: Management Ownership**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
None	13	35.1
1– 5%	15	40.5
6 – 10%	9	24.3
11 – 20%	0	0.00
More than 20%	0	0.00
<b>Total</b>	<b>37</b>	<b>100</b>

#### **Structure of ownership**

The study also conducted analysis of the structure of ownership of non-financial firms listed in NSE. The findings presented in table 4:22 revealed that majority (45.9) of the non-financial firms listed on NSE have institutions as majority shareholders while 29.8% of the firms had a mixed share ownership. Firms with individual shareholders as

majority were 13.5% and only 10.8% of the firms had state agencies as majority shareholders.

The findings agree with those in May (2007) which noted that the ownership structure of an organization and the type of managerial compensation, originally addressing concerns related to managerial risk aversion and the agency cost problem, have significant impact on a company's decision to implement corporate risk management strategies or to hedge financial risks using derivatives or foreign debt.

The findings also compare well with those of Stulz (2003) who noted that managerial stock ownership is an obvious incentive for managers to act according to the objectives of the shareholders, and will influence managers' risk perception. Firm-wide hedging makes managerial stock ownership a more effective device to induce managers to hedge financial risk.

Hedging reduces uncertainty by smoothing the cash flow stream thereby lowering the firm's cost of debt. Since the agency cost is borne by management, assuming informational asymmetry between management and bondholders, hedging will increase the value of the firm. Therefore, management will rationally choose to hedge.

**Table 4.22: Structure of Ownership**

Response	Frequency	Percentage (%)
Family	0	0.00
Individuals	5	13.5
Investors		
Institution Investors	17	45.9
States Agencies	4	10.8
Mixed Shareholding	11	29.8
<b>Total</b>	<b>37</b>	<b>100</b>

**Managerial Compensation**

The study conducted an analysis of the managerial compensation by non-financial firms listed on NSE. The findings presented in table 4:23 revealed that majority (40.5%) of the non-financial firms listed on NSE compensated their management through salary and performance based bonuses while 37.3 compensated through salaries only. 16.2% of the firms had put in place a stock purchase or allocation option for the management and directors apart from compensating them with salary. Only 13.5% of the firms had salaries, performances bonuses and share options incorporated in their compensation plan.

The non-financial firms listed on NSE have significant shareholding held by management. Because shares provide linear payoffs with respect to share price, and options provide convex payoffs, managers who own a significant part of the firm have incentives to hedge. Managers whose compensation plan consists of options can be less likely to hedge. This is consistent with Smith and Stulz (1985) who predicted that

managers with greater proportions of their wealth invested in the firm's shares would prefer to hedge, while those with options holdings would prefer not to hedge.

**Table 4.23: Managerial Compensation**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Salary only	11	37.3
Salary & Bonus Only	15	40.5
Salary & Share Options	6	16.2
Salary, Bonus & Share Options	5	13.5
Total	37	100.0

#### **4.5.6 Financial Risk Hedging Practices Amongst Non-Financial Firms**

The respondents were asked to indicate the kinds of derivatives or hedging practices the non-financial firms listed on NSE use to manage financial risk exposures.

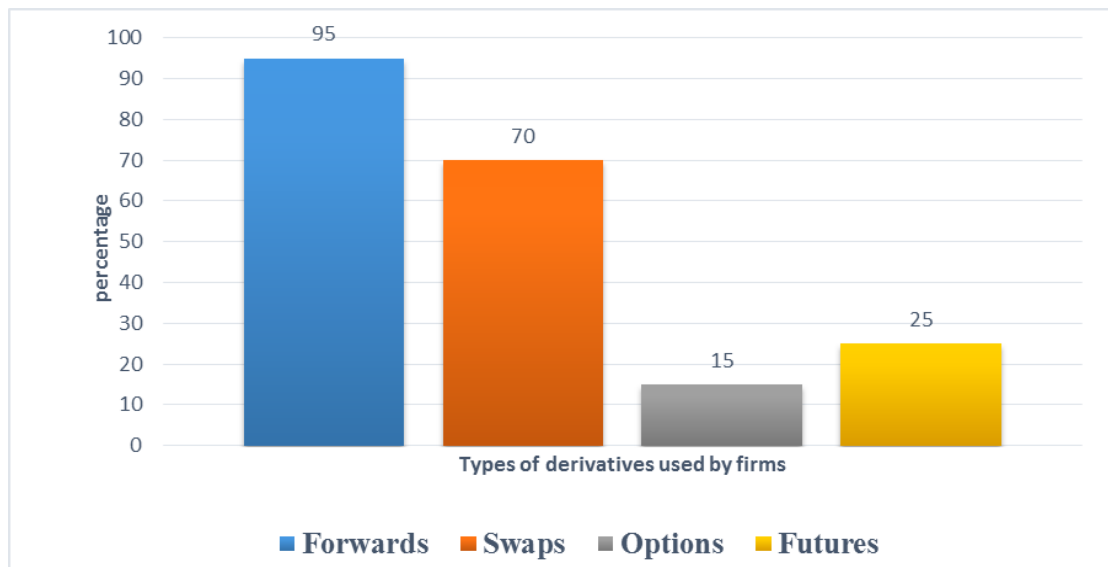
##### **Financial Hedging Practices**

The study analyzed the firms' risk hedging motivation and considered the hedging action as the dependent variable. The results presented in the table 4:24 show that majority (54.1%) of the firms considered hedged their financial risk exposure using derivatives, while 45.9% did not. The level of hedging through derivatives reported in this study is similar to that of several previous studies that examine the use of derivatives by non-financial firms. For example, Clark and Mefteh (2010) report that 66.2 percent of their sample of Fortune 500 firms use derivatives.

**Table 4.24: Hedging Financial Risk Exposure**

	Frequency	Percent
Yes	20	54.1
No	17	45.9
Total	37	100

Amongst firms hedging using derivatives, the result presented in figure 4.1 show that the most popular type of derivative is the forward contract (95%) closely followed by the swap contract (70%), futures (25%) were used by very few firms while options (15%) were even rare.



**Figure 4.1: Types of derivatives used by firms**

The findings imply that forward contracts are highly preferred by non-financial firms to manage various financial risks. The findings agree with those in ISA (2009) which note that currently, 94% of the world's largest companies use derivatives to hedge their risk. Of the 500 companies researched all corporate and financial institutions in Canada, Switzerland, the Netherlands, Great Britain, France and Japan use derivatives on a

frequent basis. In Germany and the USA 97% and 92% of the companies surveyed use derivatives, whereas in emerging markets such as South Korea and China only 87% and 62%, respectively, use derivatives to manage risk.

The findings disagree with those of Nzuki (2010) that Kenyan companies under-hedge their commodity price risks. That is, they hedge about 60% of their oil volumes compared to optimal hedge ratio of 93%. The findings agree with those of Mugwe (2011) who noted that hedging against foreign currency exposure is increasingly becoming important.

### **Objective Hedging**

Results of the objective of hedging financial risks are shown in table 4.25. Results show that majority (90%) of the respondents agreed that their objective of hedging was to maximize certainty of revenue & costs while 80% indicated that their objective was to reduce cash flow volatility. Firms, further hedge to: ‘stabilize market value of the firm’ (20 %); and, ‘reducing earning volatility’ (35%).

Kapitsinas (2008) studied derivative instruments use among Greece non-financial firms and found that derivatives are used reduce cash flow variability, minimize variation in accounting earnings and increase firm value. Bartram, Brown and Fehle (2009) established that cash flow volatility makes firm’s available liquidity be insufficient to fully meet fixed payment obligations which lead to huge financing costs. Similarly, Stulz (2003) argued that hedging instruments are employed to minimize cash flow



variability by reducing financial distress cost, underinvestment problem, and agency cost of debt among others. Chapman (2006) established that failure to hedge against risks could result in loss making and even eventual business failure. Just as the study's findings, Marek and Yousiph (2006) found that non-financial firms enter into hedging to stabilize their cash flow.

**Table 4.25: Objective Hedging**

<b>Objective Hedging</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Maximize certainty of revenue & costs	18	90
Reduce cash flow volatility	16	80
Reduce Earnings volatility'	7	35
Stabilize market value of the firm	6	30

**Concerns when Hedging**

Results of the concerns when hedging financial risks are shown in table 4.26. Results show that majority (88.2%) of the respondents agreed that their concern was the difficulty in quantifying underlying exposure as a result of using derivatives while 82.4% indicated that their concern was lack of knowledge about the overall handling of derivatives especially when they're not working as expected. Firms, further concerned with: 'accounting treatment and tax implications' (47.1 %); 'overall costs, such as transaction costs or administrative costs' (41.2 %); 'concerns about the perception of derivatives' (35.3%); and 'volatility in risk exposure' (23.5%).

The findings also reveal that non-financial firms have concerns about 'the perception of derivatives by investors, regulators and the public' and 'volatility or change in risk exposure e.g. volatile exchange rate or inflation' which had a mean of 3.47. Adams

(2011) established that hedging decisions are based on the risk attitude of the company's management team. Kamencu (2013) also established that hedging motives appear to be influenced by the management's perceptions of the stakeholder's attitudes to risk and that firms refrain from hedging because of regulatory skepticism about the use of derivatives.

Khun (2007) established that transaction costs and costs in the administration of corporate risk management is important to firms. Kamencu found that firms with extensive foreign exchange rate exposure are more likely to use currency derivatives in the right currency mix. Ngugi, Njagi and Kimani (2013) found that hedging and use of derivatives are influenced by legal and regulatory framework, capacity building, operational efficiency and the role of financial market intermediaries. El-Masry (2006) established that fluctuations in demand of foreign exchange rates have an adverse impact on our business results or financial condition as well as the choice of currency to hedge against. Döhring (2008) found that transaction risk arises from foreign-currency denominated imports in the same way as from foreign-currency denominated exports, and the exporter who invoices in his own currency runs the risk of a reduction in demand when his currency appreciates.

**Table 4.26: Concerns when Hedging**

<b>Concerns when Hedging</b>	<b>Frequency</b>	<b>Percentage %</b>
Difficulty in quantifying underlying exposure	15	88.2
Lack of knowledge about the overall handling of derivatives	14	82.4
Concerns about accounting treatment and tax implications	8	47.1
Overall costs, such as transaction costs or administrative costs	7	41.2
Concerns about the perception of derivatives	6	35.3
Volatility in risk exposure	4	23.5

**Reasons for Not Hedging Financial Risks**

Results on the reasons for not hedging financial risks are shown in table 4.27. Results show that majority (88.2%) of the respondents indicated that the Management are skeptical on uses of the derivate as risk management tool while 64.7% indicated their firms faced insufficient exposure to warrant use derivatives. Firms, further give the following reasons for not hedging: ‘exposures are more effectively managed by other means’ (58.8%); ‘difficulty pricing and valuing derivatives’ (47.1%); ‘disclosure requirement of the IFRS’(41.2%); and ‘costs of establishing and maintain a derivative program exceed the expected benefits’ (29.4%).

Likewise, Hayes (2002) found that some managers decide that it is more beneficial to assume a specific risk instead of hedging against it. Bodnar, Giambona, Graham, Harvey and Marston (2011) established that costs of establishing and maintaining a derivatives program exceed the expected benefits. Kamenchu (2013) found that the main factors hindering use of derivatives include legal framework and trade liberation.

**Table 4.27: Reasons for Not Hedging Financial Risks**

<b>Reasons for Not Hedging Financial Risks</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Insufficient exposure	11	64.7
Exposures are more effectively managed by other means	10	58.8
Difficulty pricing and valuing derivatives	8	47.1
Disclosure requirement of the IFRS	7	41.2
Costs of establishing and maintain a derivative program exceed the expected benefits	5	29.4
Management skepticism against derivative use	12	70.6

#### **4.6 Test of Assumptions of the Study Variables**

The study performed tests on statistical assumptions i.e. test of logit regression assumption and statistic used. This included test of sampling adequacy, normality, independence, and multicollinearity.

##### **4.6.1 Normality Test**

Normality was tested using the Shapiro-Wilk test which has power to detect departure from normality due to either skewness or kurtosis or both. Its statistic ranges from zero to one and figures higher than 0.05 indicate the data is normal (Razali & Wah, 2011). Shapiro-Wilk test assesses whether data is normally distributed against hypothesis that:

$H_0$ : Sample follows a Normal distribution.

$H_a$ : Sample does not follow a Normal distribution.

The tests reject the hypothesis of normality when the p-value is greater than or equal to 0.05 (Sekaran & Bougie, 2010). Table 4.28 shows that the Shapiro-Wilk statistics were Financial Distress  $p = .078$ , Underinvestment  $p = .016$ , Economies of Scale  $p = .026$  Foreign Exchange Exposure  $p = .040$  and Managerial Risk Aversion  $p = .034$  respectively. Since the p-values were greater than the significance level (0.05) (not significant if  $p < .05$ ), this implies that the variables were normally distributed.

**Table 4.28: Shapiro-Wilko**

	<b>Statistic</b>	<b>Df</b>	<b>p-value</b>
Financial Distress	.934	37	.078
Underinvestment	.874	37	.016
Economies of Scale	.855	37	.026
Foreign Exchange Exposure	.725	37	.040
Managerial Risk Aversion	.871	37	.034

#### **4.6.2 Multicollinearity Test**

Multicollinearity was tested by computing the Variance Inflation Factor (VIF) and its reciprocal, the tolerance. It is a situation in which the predictor variables in a multiple regression analysis are themselves highly correlated making it difficult to determine the actual contribution of respective predictors to the variance in the dependent variable. (Gujarat & Porter, 2009). Thus, collinearity diagnostics measure how much regressors are related to other regressors and how this affects the stability and variance of the regression estimates. The existence of multicollinearity is a vital problem in applying multiple time series regression model (Gujarat & Porter, 2009).

To detect for multicollinearity, the study examined the correlation matrix or by using Variance Inflation Factor (VIF) as shown in table 4.29. The Variance Inflation Factor (VIF) quantifies the severity of multicollinearity in an ordinary least- squares regression analysis. O'Brien (2007) suggested that a Variance Inflation Factor (VIF) greater than 10 are a sign of multicollinearity; the higher the value of VIF's, the more severe the problem. Results in table 4.30 show that all the variables had a variance inflation factors (VIF) of less than 10 that is, Financial Distress (2.897), Foreign Exchange Exposure (1.361), Underinvestment (5.186), Managerial Risk Aversion (8.572), and Economies of Scale (6.884). This implies that there was no collinearity with the variables thus all the variables were maintained in the regression model.

**Table 4.29: Collinearity Statistics**

<b>Variables</b>	<b>Tolerance</b>	<b>VIF</b>
Financial Distress	.345	2.897
Foreign Exchange Exposure	.735	1.361
Underinvestment	.193	5.186
Managerial Risk Aversion	.117	8.572
Economies of Scale	.145	6.884

### **4.6.3 Tests of Independence**

Independence of error terms, which implies that observations are independent, was assessed through the Durbin-Watson test. Durbin Watson (DW) test check that the residuals of the models were not autocorrelated since independence of the residuals is one of the basic hypotheses of logit regression analysis. Its statistic ranges from zero to four. Scores between 1.5 and 2.5 indicate independent observations (Garson, 2012). Table 4.30 shows that the DW statistics were close to the prescribed value of 2.0 that is,

Financial Distress (1.987), Foreign Exchange Exposure (2.084), Underinvestment (2.231), Managerial Risk Aversion (2.026), and Economies of Scale (2.182). This implies that there was no autocorrelation and the residuals were independent hence the study Variables were independent.

**Table 4.30: Durbin Watson Test**

<b>Variables</b>	<b>Durbin Watson</b>
Financial Distress	1.987
Foreign Exchange Exposure	2.084
Underinvestment	2.231
Managerial Risk Aversion	2.026
Economies of Scale	2.182

#### **4.7 Data Sampling Adequacy**

Kaiser-Meyer-Olkin Measure (KMO) of sampling adequacy and Bartlett's Test of Sphericity tests were conducted to establish of data's sampling adequacy. KMO measure varies between 0 and 1, and values closer to 1 are better with a threshold of 0.5. Williams, Brown and Onsman (2012) stated that KMO of 0.50 is acceptable degree for sampling adequacy. Bartlett's Test of Sphericity tests the null hypothesis that the correlation matrix is an identity matrix; that is, it analyzes if the samples are from populations with equal variances. Bartlett's test significance of 0.05 or less further indicates an acceptable degree of sampling adequacy; sample is adequate, factorable and additional analysis beyond descriptive can be done. Table 4.31 shows that the KMO measures of sampling adequacy produced values between 0.524 and 0.733 while Bartlett's test of sphericity had a consistent significance of  $p < .001$  which depicted and confirmed sampling adequacy.

**Table 4.31: KMO and Bartlett's Test**

Scale	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Sphericity Approx. Chi-Square	df	Sig.
Financial Distress	.733	928.302	91	.000
Foreign Exchange Exposure	.585	74.437	22	.000
Underinvestment	.650	429.893	22	.000
Managerial Risk Aversion	.524	3077.221	78	.000
Economies of Scale	.731	963.514	83	.000
Hedging	.702	204.052	22	.000

#### 4.8 Hypothesis Testing of the Study Variables

This study sought to establish the influence of financial distress, underinvestment cost, economies of scale, foreign exposure and managerial risk aversion on hedging practices of the non-financial firms. The tests were carried out using simple and multiple logit regression analysis. The tests were done at 5% significance level ( $\alpha = 0.05$ ). The evaluation focused on the hypotheses derived from the objectives of the study.

##### 4.8.1 Financial Distress and Hedging Practices

The first specific objective of this study was to establish the influence of financial distress on the hedging practices of non-financial firms listed on the NSE. A logistic regression analysis was conducted to predict hedging practices of non-financial firms listed in NSE using financial distress as the predictor. The study used four measures (liquidity, leverage, profitability and interest coverage) as proxies for a firm's probability of financial distress.



A test of the full model against a constant only model was statistically significant,  $\chi^2$  (df = 4,) = 35.545,  $p < 0.05$ . ). The model was able to correctly classify 94.7 percent of non-financial firms that hedged financial risks and 83.3 percent which did not hedge, for an overall success rate of 89.2 percent. Nagelkerke's  $R^2$  value of 0.823, indicating a strong relationship of 82.3% between the predictors and the grouping. The inferential goodness-of-fit test was conducted using the Hosmer–Lemeshow (H–L) test that yielded a  $\chi^2$  (7) = 1.816, and was insignificant ( $p = 0.969$ ), suggesting that the model was fit to the data well. In other words, the null hypothesis of a good model fit to data was tenable. (As shown in Appendix VII)

Table 4.32 shows the logistic regression coefficient, Wald test and odds ratio/ Exp ( $\beta$ ) for each of the predictors (liquidity, leverage, profitability and interest coverage). Employing a 0.05 criterion of statistical significance, liquidity, leverage and interest coverage made significant contribution to prediction ( $p = 0.000$ , 0.015 and 0.005 respectively). Firm's profitability was not statistically significant predictor ( $p = 0.165$ ). This is based on the Wald test that is a test that shows the contribution or importance of each of the predictor or independent variables. Variables that contribute significantly to the models should have significance value of less than 0.05 (Pallant, 2007).

The odd ratio for liquidity {Exp ( $\beta$ ) = .599} indicated that non- financial firm with less liquidity are more likely to hedge financial risk. Thus, a unit increase in liquidity levels leads to a decrease of 40.1% in the odds of hedging financial risk, having allowed for leverage position, profitability levels and interest coverage. Thus, a high liquidity levels

are associated with a decrease in hedging financial risk. The findings agree with those of Bartram, Brown and Fehle (2009) who found that firms hedge to reduce their liquidity risks, thus placing them in a position to meet their financial obligations and reduce bankruptcy costs. They further established that firms with less liquidity are more likely to hedge. Gay, Lin and Smith (2011) had examined the relationship between the use of derivatives and the cost of equity. They found that quick ratio is negatively correlated with hedging, because high liquid firms have less significant expected cost of financial distress hence less motivation to hedge.

The odd ratio for leverage {Exp ( $\beta$ ) = 1.549} indicated that high leverage non- financial firm are more likely to hedge financial risk. This implies a unit increase in leverage leads to an increase of 54.9% in the odds of increase in hedging financial risk, having allowed for liquidity, profitability and interest coverage. Thus, a high leverage is associated with an increase in hedging financial risk. This result agrees with the results of Dolde (1995) who found a positive relationship between financial hedging and leverage for his sample of US firms. The finding are also confirmed by Haushalter (2000), who found that companies with greater financial leverage manage financial risk more extensively. Afza and Alam (2011) also found that firms with a high leverage ratio edged more with derivatives in order to reduce the variability of their firm profit. Thus, the leveraged and hedging is positive and significant related.

The odd ratio of firm's profitability, although not statistically significant, indicated that a non-financial firm with a unit increase in profitability was 4.9% times more likely to

hedging financial risk, having allowed for liquidity, leverage and interest coverage. The finding disagree with Jang and Park (2011) who's research pointed out that firms with high profitability, they have less incentives to engage in hedging because of a lack of financial distress. Firm profits, which has played an important role in previous research on the determinants of hedging, does not have a decisive impact on the firms' decision to hedge.

The odd ratio for interest coverage {Exp ( $\beta$ ) = .603} indicated that non- financial firm with lower interest coverage are more likely to hedge financial risk. That is a unit decrease in interest coverage leads to an increase of 39.7% in the odds of hedging financial risk, having allowed for liquidity, leverage and profitability. Thus, a high interest coverage are associated with a decrease in hedging financial risk. Judge, 2006 measured financial distress through interest coverage (IC) ratio. He found out firms with higher IC ratio had a lower probability of going bankrupt, hence a negative relationship between this ratio and hedging. Smith and Stulz (1985) also found out that corporate use of derivatives decreases with increase in interest coverage.

**Table 4.32: Financial distress Variables in the Equation**

<b>Predictors</b>	<b>B</b>	<b>S.E.</b>	<b>Wald</b>	<b>Df</b>	<b>Sig.</b>	<b>Exp(<math>\beta</math>)</b>
Liquidity	-.513	.369	1.930	1	.000	.599
Leverage	1.325	.522	6.447	1	.015	1.549
Profitability	3.022	.636	22.601	1	.165	1.049
Interest coverage	-.506	.399	1.607	1	.005	.603
Constant	1.975	.382	14.315	1	.000	0.236

**H<sub>01</sub>: Financial distress ((liquidity, leverage, profitability and interest coverage) does not significantly influence hedging practices of non-financial firms listed at the NSE.**

Hypothesis was formulated to test the influence of financial distress on hedging practices of non-financial firms listed at NSE. The hypothesis for liquidity, leverage and interest coverage were not supported, as their p-value ( $p = 0.000, 0.015$  and  $0.005$  respectively) revealed that they significantly influence hedging practices of non-financial firms listed at the NSE. The hypothesis for profitability was supported, as the p-value ( $p=0.258$ ) revealed that there is no relationship between the firm's profitability and hedging practices of non-financial firms listed at NSE. This value showed that a firm's profitability has no significant effect hedging practices of non-financial firms listed at NSE.

**Table 4.33: Hypotheses for Financial Distress Influence on Hedging Practices.**

<b>Financial Distress Proxy</b>	<b>Hypothesis</b>	<b>P-Value</b>	<b>Decision</b>
Liquidity	H01a: Liquidity does not significantly influence hedging practices of non-financial firms listed at the NSE.	0.000	Rejected
Leverage	H01b: Leverage does not significantly influence hedging practices of non-financial firms listed at the NSE.	0.015	Rejected
Profitability	H01c: profitability does not significantly influence hedging practices of non-financial firms listed at the NSE	0.165	Fail to reject
Interest coverage	H01d: interest coverage does not	0.005	Rejected

#### 4.8.2 Underinvestment Cost and Hedging Practices

The second objective of the study was to establish the effect of underinvestment cost on hedging practices of non-financial firms listed on NSE. A logistic regression analysis was conducted to predict hedging practices of non-financial firms listed in NSE using underinvestment as the predictor. The study used four measures (Research and development to total sales, capital expenditure to total sales, price earnings ratio and market to book value) as proxies for a firm's probability of underinvestment cost.

A test of the full model against a constant only model was statistically significant,  $\chi^2$  (df = 4,) = 24.915,  $p < 0.05$ . ). The model was able to correctly classify 78.9 percent of non-financial firms that hedged financial risks and 83.3 percent which did not hedge, for an overall success rate of 81.1 percent. Nagelkerke's  $R^2$  value of 0.654, indicating a strong relationship of 65.4% between the predictors and the grouping. The inferential goodness-of-fit test was conducted using the Hosmer–Lemeshow (H–L) test that yielded a  $\chi^2$  (7) = 10.332, and was insignificant ( $p=0.171$ ), suggesting that the model was fit to the data well. In other words, the null hypothesis of a good model fit to data was tenable. (As shown in Appendix VIII)

Table 4.34 shows the logistic regression coefficient, Wald test and odds ratio/ Exp ( $\beta$ ) for each of the predictors (1 (Research and development, Capital expenditure, Price earnings ratio, market to book value). Employing a 0.05 criterion of statistical

significance, Research and development, and Capital expenditure made significant contribution to prediction ( $p = 0.034$ , and  $0.024$  respectively). Firm's price earnings ratio and market to book value were not statistically significant predictor.

The odd ratio for Research and development Expenditure  $\{\text{Exp}(\beta) = 1.298\}$  indicated that non-financial firm with high expenditure in research and development are more likely to hedge financial risk. That is a unit increase on expenditure in research and development leads to an increase of 29.8% in the odds of hedging financial risk, having allowed for Capital expenditure, Price earnings ratio, market to book value. Thus, a high expenditure on research and development are associated with an increase in hedging financial risk. The findings agree with Nance, Smith, and Smithson (1993), Geczy, Minton, and Schrand (1995), and Lel (2006) found that firms with high levels of research and development (R&D) expenses are more likely to hedge financial risk using some form of derivatives instrument. Lin and Smith (2007) also found that derivatives users had greater R&D expenditures as compared to non-users. R&D intensive non-financial firms listed at NSE are more likely to hedge since they experience difficulties in raising external funds due to the nature of their principally intangible assets emanating from research and development. Not only are intangible assets undesirable collateral, but it is also hard to ensure the quality of R&D projects, resulting in asymmetric information between management and creditors. Since cash is critical for the firm's operations, these firms are dependent on stable and secure access to capital which hedging ensures.

The odd ratio for Capital expenditure  $\{\text{Exp}(\beta) = 1.050\}$  indicated Capital expenditure has marginal effects on the likelihood of hedging financial risk. The marginal effect show that a unit increase on expenditure in Capital expenditure leads to an increase of 5% in the odds of hedging financial risk, having allowed for research and development expenditure, Price earnings ratio, market to book value. Thus, a high expenditure on Capital expenditure are associated with an increase in hedging financial risk. Bartram, Brown and Fehle (2006) found that capital expenditure has a positive and significant relationship with hedging. Cui and Vaja (2008) also found that firms with higher investment opportunities tend to hedge more.

The odd ratio for price earnings ratio  $\{\text{Exp}(\beta) = 2.172\}$ , though not statistically significant, indicated that non-financial firm with high price earnings ratio are more likely to hedge financial risk. That is a unit increase in price earnings ratio leads to an increase of 117.2% in the odds of hedging financial risk, having allowed for research and development expenditure, capital expenditure and market to book value. The findings disagree with Berkman and Bradbury (1996) using the earnings price ratio in their study of derivatives use by New Zealand firms found out that firms with high P/E ratio hedged more.

The odd ratio for market to book value {Exp ( $\beta$ ) = 0.821}, though not statistically significant, indicated that non- financial firm with high market to book value are less likely to hedge financial risk. That is a unit increase on market to book value leads to a decrease of 17.9% in the odds of hedging financial risk, having allowed for research and development expenditure, capital expenditure and price earnings ratio. The findings agree with Mian (1996), using a market-to-book-value ratio to proxy for a firm's future investment opportunities, found a negative relation between a firm's investment opportunities and its derivatives use, which did not support the underinvestment hypothesis. However, for a sample of New Zealand firms, Berkman and Bradbury (1996) found little support for the underinvestment hypothesis when using market-to-book-value ratio variable to capture a firm's investment opportunity set.

**Table 4.34: Underinvestment Variables in the Equation**

<b>Predictors</b>	<b>B</b>	<b>S.E.</b>	<b>Wald</b>	<b>df</b>	<b>Sig.</b>	<b>Exp(<math>\beta</math>)</b>
Research and development to total sales	.832	.699	1.416	1	.034	1.298
Capital expenditure to total assets	2.402	1.067	5.073	1	.024	1.050
Price earnings ratio	.776	.621	1.560	1	.212	2.172
Market vs book value	-.197	.594	.110	1	.740	.821
Constant	-10.901	3.817	8.158	1	.004	.000

**H<sub>02</sub>: Underinvestment cost does not significantly influence hedging practices of non-financial firms listed at the NSE.**



Hypothesis was formulated to test the influence of underinvestment cost on hedging practices of non-financial firms listed at NSE. The hypothesis for research and development expenditure and capital expenditure were not supported, as their p-value ( $p = 0.034$  and  $0.24$  respectively) revealed that they significantly influence hedging practices of non-financial firms listed at the NSE. The hypothesis for price earnings ratio and market book value was supported, as the p-value ( $p=0.212$  and  $0.740$  respectively) revealed that do not influence hedging practices of non-financial firms listed at NSE. This value showed that a firm's price earnings ratio and market to book value do not have significant effect hedging practices of non-financial firms listed at NSE.

**Table 4.35: Hypotheses for Underinvestment Cost Influence on Hedging Practices.**

<b>Underinvestment proxy</b>	<b>Hypothesis</b>	<b>P-Value</b>	<b>Decision</b>
Research and Development Expenditure	H02a: Research and Development Expenditure does not significantly influence hedging practices of non-financial firms listed at the NSE.	0.034	Rejected
Capital Expenditure to Total Assets	H02b: Capital Expenditure does not significantly influence hedging practices of non-financial firms listed at the NSE.	0.024	Rejected
Price Earnings Ratio	H02c: Price Earnings Ratio does not significantly influence hedging practices of non-financial firms listed at the NSE	0.212	Fail to reject
Market to Book Value	H02d: Market to Book Value does not significantly influence hedging practices of non-financial firms listed at the NSE	0.740	Fail to reject

### **4.8.3 Economies of Scale and Hedging Practices**

The third objective of the study was to establish the effect of economies of scale on hedging practices of non-financial firm. A logistic regression analysis was conducted to predict hedging practices of non-financial firms listed in NSE using economics scale as

the predictor. The study used three measures (total sales, total assets, market value) as proxies for a firm's probability of economics of scale.

A test of the full model against a constant only model was statistically significant,  $\chi^2$  (df = 3,) = 26.841,  $p < 0.05$ . ) . The model was able to correctly classify 94.7 percent of non-financial firms that hedged financial risks and 88.9 percent which did not hedge, for an overall success rate of 91.9 percent. Nagelkerke's  $R^2$  value of 0.688, indicating a strong relationship of 68.8% between the predictors and the grouping. The inferential goodness-of-fit test was conducted using the Hosmer–Lemeshow (H–L) test that yielded a  $\chi^2$  (7) =12.318, and was insignificant ( $p=0.091$ ), suggesting that the model was fit to the data well. In other words, the null hypothesis of a good model fit to data was tenable. (As shown in Appendix VIII)

Table 4.36 shows the logistic regression coefficient, Wald test and odds ratio/ Exp ( $\beta$ ) for each of the predictors (Total Sales, Total assets, Market Capitalization). Employing a 0.05 criterion of statistical significance, total sales and total assets made significant contribution to prediction ( $p = 0.025$  and  $0.037$  respectively). Firms market capitalization was not statistically significant predictor ( $p = 0.203$ ).

The odd ratio for total sales {Exp ( $\beta$ ) = 1.932} indicated that non- financial firm with more sales are more likely to hedge financial risk. That is a unit increase in sales levels leads to an increase of 93.2% in the odds of hedging financial risk, having allowed for total assets and market value. Thus, a high sales levels are associated with an increase in hedging financial risk. The findings agree with those of Mian (1999), who found robust

evidence that larger firms are more likely to hedge. Mian's evidence supports the hypothesis that there are economies of scale in hedging and that information and transaction considerations have more influence on hedging than the cost of raising capital. The finding demonstrates that firms with larger economies of scale are more likely to afford implementing and maintaining a risk management program. This because they can afford a well-established risk management team and strategy to hedge various risks such as currency risks and interest risks together. These firms are able to take the advantage of the scale and allocate certain fixed hedging cost into a wider range and larger amount of hedging activities.

The odd ratio for total assets  $\{\text{Exp}(\beta) = 1.717\}$  indicated that non- financial firm with more assets are more likely to hedge financial risk. That is a unit increase in assets levels leads to an increase of 71.7% in the odds of hedging financial risk, having allowed for total sales and market value. Thus, a high assets levels are associated with an increase in hedging financial risk. This result is consistent with the findings of Rothman (2001), focusing on the use of derivatives in non-financial companies, found that non-use of derivatives stemmed from high establishment costs, as well as maintenance costs associated with difficult pricing and valuing issues surrounding hedging instruments. These findings certainly support the findings of Stulz (1996) and Dionne & Triki (2004), that risk management is an expensive activity. As such, one can deduce that the higher cost would most likely be more punitive for smaller, as opposed to larger, corporations.

The odd ratio for Market capitalization  $\{\text{Exp}(\beta) = 1.121\}$ , though not statistically significant, indicated that non-financial firms with high market capitalization are more likely to hedge financial risk. That is a unit increase on market capitalization leads to an increase of 12.1% in the odds of hedging financial risk, having allowed for research and development expenditure, capital expenditure and market to book value. However, there are competing arguments for either a positive or negative relation between market capitalization and hedging activity. The findings disagree with Mian (1996) found that hedging exposures that are less than market capitalization of \$5 million is not very cost-effective. Small firms have a greater incentive to hedge because of the inverse relation between market capitalization and direct bankruptcy costs, because they have greater information asymmetries implying costly external financing and because the fixed transaction costs associated with external financing activities are likely to make financing more expensive for smaller firms. On the other hand, hedging activity exhibits significant information and transaction cost scale economies implying that larger firms are more likely to hedge.

**Table 4.36: Economics of Scale Variables in the Equation**

<b>Predictors</b>	<b>(<math>\beta</math>)</b>	<b>S.E.</b>	<b>Wald</b>	<b>Df</b>	<b>Sig.</b>	<b>Exp(<math>\beta</math>)</b>
Total sales	1.076	.560	3.696	1	.025	1.932
Total asset	.541	.606	.795	1	.037	1.717
Market Capitalization	.752	.590	1.621	1	.203	1.121
Constant	-7.646	2.448	9.757	1	.002	.000

**H<sub>03</sub>: Economics of scale does not significantly influence hedging practices of non-financial firms listed at the NSE.**

Hypothesis was formulated to test the influence of economics of scale on hedging practices of non-financial firms listed at NSE. The hypothesis for total sales and total assets were not supported, as their p-value ( $p = 0.025$ , and  $0.037$  respectively) revealed that they significantly influence hedging practices of non-financial firms listed at the NSE. The hypothesis for market value was supported, as the p-value ( $p=0.203$ ) revealed that it doesn't influence hedging practices of non-financial firms listed at NSE. This value showed that a firm's market value has no significant effect hedging practices of non-financial firms listed at NSE.

**Table 4.37: Hypotheses for Economics of Scale Influence on Hedging Practices.**

<b>Economics of scale proxy</b>	<b>Hypothesis</b>	<b>P-Value</b>	<b>Decision</b>
Total sales	H <sub>03a</sub> : Total sales does not significantly influence hedging practices of non-financial firms listed at the NSE.	.025	Rejected
Total Asset Value	H <sub>03b</sub> : Total Assets value does not significantly influence hedging practices of non-financial firms listed at the NSE.	0.037	Rejected
Market Capitalization	H <sub>03c</sub> : Market Capitalization covers does not significantly influence hedging practices of non-financial firms listed at the NSE	.203	Fail to reject

#### **4.8.4 Foreign Exposure and Hedging Practices**

The fourth objective of the study was to establish the effect of foreign exposure on hedging practices of non-financial firms listed on NSE. A logistic regression analysis was conducted to predict hedging practices of non-financial firms listed in NSE using foreign exposure as the predictor. The study used four measures (foreign revenue, foreign costs, subsidiary abroad and foreign debt) as proxies for a firm's probability of foreign exposure.

A test of the full model against a constant only model was statistically significant,  $\chi^2$  (df = 4,) = 34.883,  $p < 0.05$ . ). The model was able to correctly classify 88.9 percent of non-financial firms that hedged financial risks and 89.5 percent which did not hedge, for an overall success rate of 89.2 percent. Nagelkerke's  $R^2$  value of 0.814, indicating a strong relationship of 81.4% between the predictors and the grouping. The inferential goodness-of-fit test was conducted using the Hosmer–Lemeshow (H–L) test that yielded a  $\chi^2$  (7) = 8.082, and was insignificant ( $p=0.325$ ), suggesting that the model was fit to the

data well. In other words, the null hypothesis of a good model fit to data was tenable. (As shown in Appendix IX)

Table 4.38 shows the logistic regression coefficient, Wald test and odds ratio/ Exp ( $\beta$ ) for each of the predictors (foreign revenue, foreign costs, subsidiary abroad and foreign debt). Employing a 0.05 criterion of statistical significance, foreign revenue, subsidiary abroad and foreign debt made significant contribution to prediction ( $p = 0.040, 0.42$  and  $0.011$  respectively). Firm's foreign cost was not statistically significant predictor ( $p = 0.144$ ).

The odd ratio for foreign revenue Exp ( $\beta$ ) = 1.021} indicated that non- financial firm with more foreign revenue are more likely to hedge financial risk. That is a unit increase in foreign revenue leads to an increase of 2.1% in the odds of hedging financial risk, having allowed for foreign costs, subsidiary abroad and foreign debt. Thus, a high foreign revenue are associated with an increase in hedging financial risk. The findings agree with those of Allayannis and Ofek (2001), who noted that the extent of corporate hedging (or corporate risk management) can be determined by various exposure factors such as foreign sales and foreign trade. The findings are consistent with Khun (2007) who stated that the larger the (economic) exposure a company is facing, the more likely it is that this company will commit to corporate risk management activities.

The odd ratio for foreign cost {Exp ( $\beta$ ) = 0.234}, though not statistically significant, indicated that non- financial firm with high foreign cost are less likely to hedge financial risk. That is a unit increase in foreign costs leads to a decrease of 76.6% in the odds of

hedging financial risk, having allowed for foreign revenue, subsidiary abroad and foreign debt. The findings disagree with those of Pantzalis (2001), who noted that foreign exposure results unexpected changes on the firm's input costs.

The odd ratio for subsidiary abroad  $\{\text{Exp}(\beta) = 1.717\}$  indicated that non-financial firm with more subsidiary abroad are more likely to hedge financial risk. That is a unit increase in subsidiary abroad levels leads to an increase of 71.7% in the odds of hedging financial risk, having allowed for foreign revenue, foreign costs and foreign debt. Thus, increase in subsidiary abroad are associated with an increase in hedging financial risk. The finding agree with Allayannis and Miller (2012) who while examining the impact of currency derivatives on firm subsidiaries using a broad sample of firms from 39 countries with significant exchange rate exposure found a strong evidence that the use of currency derivatives for hedging risks is associated with a subsidiary abroad. Additionally, Magee (2009) use a sample of 408 large US firms to investigate the impacts of foreign currency derivatives on subsidiaries abroad found a positive relationship between foreign currency derivatives and firm value. But found no relationship between firm value and foreign currency hedging after controlling the dependence of foreign currency hedging on past amount of firm value. Kenyan firms mostly operate internationally, thus a greater emphasis on currency exposure and foreign exchange risk hedging policies in Kenya is expected.

The odd ratio for foreign debt  $\{\text{Exp}(\beta) = 1.523\}$  indicated that non-financial firm with more foreign debt are more likely to hedge financial risk. That is a unit increase in



foreign debt leads to an increase of 52.3% in the odds of hedging financial risk, having allowed for foreign revenue, foreign costs and foreign debt. Thus, a high foreign debt are associated with an increase in hedging financial risk.

**Table 4.38: Foreign Exposure Variables in the Equation**

Predictors	( $\beta$ )	S.E.	Wald	Df	Sig.	Exp( $\beta$ )
Foreign revenue	1.792	.874	4.201	1	.040	1.021
Foreign cost	-1.452	.992	2.140	1	.144	.234
Subsidiary abroad	1.008	.917	1.208	1	.042	1.741
Foreign debt	3.512	1.383	6.449	1	.011	1.523
Constant	-9.987	4.023	6.162	1	.013	.000

**H<sub>04</sub>: Non-financial firms' foreign exposure (foreign revenue, foreign costs, subsidiary abroad and foreign debt) does not significantly influence their hedging practices.**

Hypothesis was formulated to test the influence of foreign exposure on hedging practices of non-financial firms listed at NSE. The hypothesis for (foreign revenue, subsidiary abroad and foreign debt) were not supported, as their p-value ( $p = 0.040, 042$  and  $0.011$  respectively) revealed that they significantly influence hedging practices of non-financial firms listed at the NSE. The hypothesis for foreign costs was supported, as the p-value ( $p=0.144$ ) revealed that it doesn't influence hedging practices of non-financial firms listed at NSE. This value showed that a firm's foreign costs has no significant effect hedging practices of non-financial firms listed at NSE.

**Table 4.39: Hypotheses for Foreign Exposure Influence on Hedging Practices.**

<b>Foreign exposure proxy</b>	<b>Hypothesis</b>	<b>P-Value</b>	<b>Decision</b>
Foreign revenue	H <sub>04a</sub> : Foreign revenue levels does not significantly influence hedging practices of non-financial firms listed at the NSE.	0.040	Rejected
Foreign Cost	H <sub>04b</sub> : foreign purchase levels does not significantly influence hedging practices of non-financial firms listed at the NSE.	0.144	Fail to reject
Subsidiary abroad	H <sub>04c</sub> : subsidiary abroad does not significantly influence hedging practices of non-financial firms listed at the NSE	0.011	Rejected
Foreign debt	H <sub>04d</sub> : foreign debt does not significantly influence hedging practices of non-financial firms listed at the NSE	0.013	Rejected

#### **4.8.5 Managerial Risk Aversion and Hedging Practices**

The fifth objective of the study was to establish the effect of managerial risk aversion on hedging practices of non-financial firms listed on NSE. A logistic regression analysis was conducted to predict hedging practices of non-financial firms listed in NSE using managerial risk aversion as the predictor. The study used three measures (Management ownership, structure of ownership and management compensation) as proxies for a firm's probability of managerial risk aversion.

A test of the full model against a constant only model was statistically significant,  $\chi^2$  (df = 3) = 23.425,  $p < 0.05$ . The model was able to correctly classify 89.5 percent of non-financial firms that hedged financial risks and 88.9 percent which did not hedge, for an overall success rate of 89.2 percent. Nagelkerke's  $R^2$  value of 0.626, indicating a strong relationship of 62.6% between the predictors and the grouping. The inferential goodness-of-fit test was conducted using the Hosmer–Lemeshow (H–L) test that yielded

a  $\chi^2 (7) = 5.920$  and was insignificant ( $p = 0.549$ ), suggesting that the model was fit to the data well. In other words, the null hypothesis of a good model fit to data was tenable. (As shown in Appendix XI)

Table 4.40 shows the logistic regression coefficient, Wald test and odds ratio/ Exp ( $\beta$ ) for each of the predictors (Management ownership, structure of ownership and management compensation). Employing a 0.05 criterion of statistical significance, only management compensation made significant contribution to prediction ( $p = 0.040$ ). Firm's Management ownership and structure of share ownership were not statistically significant predictors ( $p = 0.059$  and  $0.140$  respectively).

The odd ratio for management ownership {Exp ( $\beta$ ) = 1.283}, though not statistically significant, indicated that non- financial firm with more management ownership are more likely to hedge financial risk. That is a unit increase in management ownership leads to an increase of 28.3% in the odds of hedging financial risk, having allowed for structure of ownership and managerial compensation. The findings agree with Afza and Alam (2011) found that managerial ownership had in insignificant influence on derivative usage. Managers engage in the hedging when they are exposed to a certain high risk in their firm operations to protect the company's benefits regardless to the portion of shareholding by them.

The odd ratio for structure of ownership {Exp ( $\beta$ ) = 1.944}, though not statistically significant, indicated that non- financial firm with high structure of ownership are more likely to hedge financial risk. That is a unit increase on structure of ownership ratio leads

to an increase of 94.4% in the odds of hedging financial risk, having allowed for Management ownership and management compensation. Smith and Stulz (1985) found that there is a positive relationship between management shareholdings and the use of derivatives. Geczy, Minton and Schrand (1997) found out that there is a negative relationship between structures of ownership with the derivative usage. From the result, the structure of ownership proxy is not consistent with result from other studies. This is due to the large ownership of Kenyan firms by institutional shareholders and Government agencies as opposed to individual shareholders and families.

The odd ratio for managerial compensation  $\{Exp(\beta) = 1.986\}$  indicated that non-financial firm with more managerial compensation are more likely to hedge financial risk. That is a unit increase in managerial compensation leads to an increase of 98.6% in the odds of hedging financial risk, having allowed for management ownership and managerial compensation. The findings agree with those of May (1995) who noted that the type of managerial compensation have significant impact on a company's decision to hedge financial risks using derivatives or foreign debt. The findings also compare well with those of Stulz (2003) who noted that share options and bonus schemes are obvious incentive for managers to act according to the objectives of the shareholders, and will influence managers' risk perception.

**Table 4.40: Managerial risk aversion Variables in the Equation**

Predictors	( $\beta$ )	S.E.	Wald	df	Sig.	Exp( $\beta$ )
Management ownership	1.189	.629	3.571	1	.059	3.283
structure of ownership	.664	.450	2.178	1	.140	1.944
Managerial Compensation	1.094	.532	4.230	1	.040	2.986
Constant	-6.727	2.302	8.538	1	.003	.001

**H<sub>05</sub>: Managerial risk aversion does not significantly influence hedging practices of non-financial firms listed at the NSE.**

Hypothesis was formulated to test the influence of managerial risk aversion on hedging practices of non-financial firms listed at NSE. The hypothesis for managerial compensation was not supported, as their p-value ( $p = 0.40$ ) revealed that they significantly influence hedging practices of non-financial firms listed at the NSE. The hypothesis for management ownership and structure of ownership were supported, as the p-value ( $p=0.59$  and  $0.140$  respectively) revealed that do not influence hedging practices of non-financial firms listed at NSE.

**Table 4.41: Hypotheses for Managerial Risk Aversion Influence on Hedging Practices.**

<b>Managerial risk aversion proxy</b>	<b>Hypothesis</b>	<b>P-Value</b>	<b>Decision</b>
Management ownership	H <sub>05a</sub> : Management ownership does not significantly influence hedging practices of non-financial firms listed at the NSE.	.059	Fail to reject
Structure of ownership	H <sub>05b</sub> : Structure of ownership does not significantly influence hedging practices of non-financial firms listed at the NSE.	.140	Fail to reject
Managerial compensation	H <sub>05c</sub> : Managerial compensation does not significantly influence hedging practices of non-financial firms listed at the NSE	.040	Rejected

#### **4.9 Overall Multivariate Logit Regression Model**

The Multivariate Logit Model tests was conducted to predict hedging practices of non-financial firms listed in NSE using financial distress, Underinvestment cost, economics of scale, foreign Exposure and managerial risk aversion as the predictor. A test of the full model against a constant only model was statistically significant,  $\chi^2$  (df = 5.) = 33.107,  $p < 0.05$ . ). The model was able to correctly classify 84.2 percent of non-financial firms that hedged financial risks and 88.9 percent which did not hedge, for an overall success rate of 86.5 percent. Nagelkerke's  $R^2$  value of 0.789, indicating a strong relationship of 78.9% between the predictors and the grouping. The inferential goodness-of-fit test was conducted using the Hosmer–Lemeshow (H–L) test that yielded a  $\chi^2$  (8) = 3.914, and was insignificant ( $p=0.789$ ), suggesting that the model was fit to the data well. In other words, the null hypothesis of a good model fit to data was tenable. (As shown in Appendix XII)

Table 4.32 shows the logistic regression coefficient, Wald test and odds ratio/ Exp ( $\beta$ ) for each of the predictors (financial distress, Underinvestment cost, economics of scale, foreign Exposure and managerial risk aversion). Employing a 0.05 criterion of statistical significance, all the predictors made significant contribution to prediction ( $p = .039, .017, .014, .038, \text{ and } .024$  respectively).

The odd ratio for Financial Distress  $\{\text{Exp}(\beta) = 1.987\}$  indicated that highly distressed non-financial firms are more likely to hedge financial risk. This implies a unit increase in financial distress leads to an increase of 58.7% in the odds of increase in hedging financial risk. Thus, a financial distress is associated with an increase in hedging financial risk. Finding agrees with Judge (2002) who indicated that transaction costs of financial distress can induce firms to hedge financial risks since the probability of incurring the distress costs is reduced. The finding also agrees with Stulz (2002), who noted that financial risk management reduces the probability of firms defaulting on its financial obligations. Furthermore, the findings are also consistent with Bartram, Brown and Fehle (2009) who argue that hedging reduces the probability of financial distress and its associated costs.

The odd ratio for Underinvestment cost  $\{\text{Exp}(\beta) = 1.181\}$  indicated that non-financial firms experiencing high growth are more likely to hedge financial risk. This implies a unit increase in Underinvestment cost leads to an increase of 18.1% in the odds of increase in hedging financial risk. Thus, a high underinvestment cost leverage is associated with an increase in hedging financial risk. The result of underinvestment cost

(investment growth) variable is consistent to Opler, Lee, Stulz and Williamson (1999) research result. This is because the company growth is higher, it will be involved in a lot of investment project and thus lead the firm to be exposed to more risks such as foreign exchange risk, commodities price risk and other risk. Therefore, firms like to hedge more to reduce those risks when they have a huge investment growth. The results also agree with Froot, Scharfstein, and Stein (1993) who found that costly external financing of firm's growth opportunities makes hedging a value-enhancing strategy.

The odd ratio for Economics of Scale {Exp ( $\beta$ ) =1.486} indicated that high large non-financial firm are more likely to hedge financial risk. This implies a unit increase in Economics of Scale leads to an increase of 48.6% in the odds of increase in hedging financial risk. Thus, high Economics of Scale is associated with an increase in hedging financial risk. These findings agree with Sullivan and Sheffrin's (2003) who viewed that larger firms are usually rated by the financial markets to be more 'credit worthy' and have access to credit facilities, with favorable rates of borrowing which in turn reduces their financial distress. In contrast, smaller firms often face higher rates of interest on overdrafts and loans. Businesses quoted on the stock market can normally raise fresh money (i.e. extra financial capital) more cheaply through the issue of shares. They are also likely to pay a lower rate of interest on new company bonds issued through the capital markets.

The odd ratio for Foreign Exposure {Exp ( $\beta$ ) =1.882} indicated that non- financial firm that have more foreign exposure are likely to hedge financial risk. This implies a unit



increase in Foreign Exposure leads to an increase of 88.2% in the odds of increase in hedging financial risk. Thus, a high Foreign Exposure is associated with an increase in hedging financial risk. The findings agree with those of Allayannis and Ofek (2001), who noted that the extent of corporate hedging can be determined by various exposure factors such as foreign sales and foreign trade. The findings are consistent with Khun (2007) who stated that the larger the (economic) exposure a company is facing, the more likely it is that this company will commit to corporate risk management activities.

The odd ratio for Managerial Risk Aversion  $\{\text{Exp}(\beta) = 1.088\}$  indicated that high Managerial Risk Aversion non-financial firms are more likely to hedge financial risk. This implies a unit increase in Managerial Risk Aversion leads to an increase of 8.8% in the odds of increase in hedging financial risk. Thus, a high Managerial Risk Aversion is associated with an increase in hedging financial risk. The findings compare well with those in Stulz (2000) which noted that the impact of different kinds of investors on a company's decision to pursue corporate risk management. Depending on the controlling ownership, an investor will influence the management team to adjust the risk management activities of the company according to the investor's individual interest and motivation. In general, however, and similar to the situation of the management of a company, investors holding large stakes in a company will value a corporate risk management program because of their undiversified position. The findings are also in line with Stulz (2003) who noted that investors want their risks to be reduced, which can be reached by corporate risk management and hedging. In addition, hedging firms want

to hold and support large investors for reasons such as their controlling and monitoring position which also adds value to a company

**Table 4.42: Overall Multivariate Logit Regression Model**

Variables	B	S.E.	Wald	Df	Sig.	Exp(B)
Financial Distress	.669	.791	.715	1	.039	1.512
Under investment cost	.458	.915	.251	1	.017	1.181
Economics of Scale	2.138	.871	6.033	1	.014	1.486
Foreign Exposure	.600	.653	.844	1	.038	1.822
Managerial Risk Aversion	.951	.834	1.299	1	.024	1.088
Constant	.225	.157	2.065	1	.151	1.252

The multivariate logit model was as follows;

$$\log\left(\frac{p(\bar{x})}{1-p(\bar{x})}\right) = 2.138x_1 + 0.951x_2 + 0.669x_3 + 0.600x_4 + 0.458x_5$$

Where;

$p(\bar{x})$  = is the probability of hedging

$1 - p(\bar{x})$  = is the probability of not hedging

$X_1$  = Financial Distress

$X_2$  = underinvestment

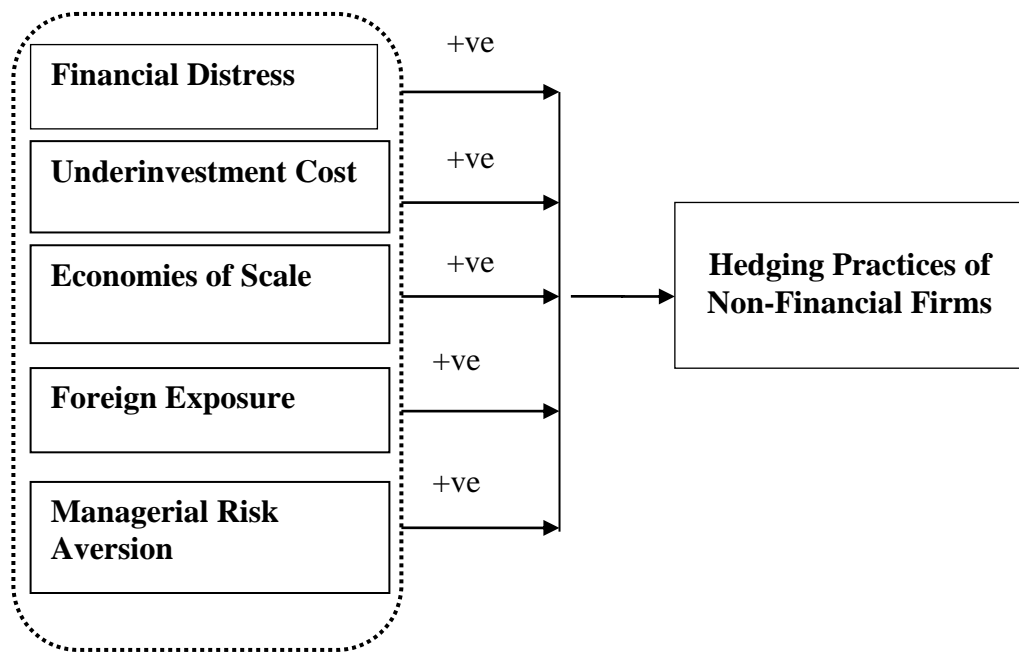
$X_3$  = economies of scale

$X_4$  = foreign risk exposure

$X_5$  = managerial risk aversion

### 4.9.1 Optimal Framework

From the findings of the study, all the variables used in analysis were found to significantly contribute or determine hedging practices of non-financial firms. The hypotheses of this study were tested by conducting inferential analysis where it was discovered that the *p*-value of: financial distress was 0.039; underinvestment cost was 0.017; economies of scale was 0.014; foreign exposure was 0.038; managerial risk aversion was 0.024. From the inferential analysis used in this study to test the initial hypotheses statements of the study constructs and their relationships, the optimal hypothetical model is as illustrated in figure 5.1



Independent Variables

Dependent Variable

Figure 4.2: Revised Optimal Model

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter presents the summary of the data findings presented in the previous chapter, conclusions and recommendations there-to. The chapter is, thus, structured into summary, conclusions, recommendations and further research. The study sought to establish the determinants of hedging practices among non-financial firms listed at NSE.

#### **5.2 Summary**

The study is based on establishing the determinants of hedging practices of non-financial firms listed at NSE and is hinged on the premise that firms' specific characteristics influence hedging of financial risks. The study was conducted on all the 39 non-financial firms listed on the NSE. The summary of the findings were as below:

##### **5.2.1 Financial Distress**

The study established that liquidity, leverage and interest coverage proxies made significant contribution to prediction of firms hedging practices. Firm's profitability was not statistically significant predictor. From the overall model results, it was established that financial distress had positive influence on the motive of non-financials firms hedging financial risks. The odd ratio for financial distress was  $\{Exp(\beta) = 1.512\}$ , implying a unit increase in financial distress leads 51.2% increase in the odds of hedging financial risk.

### **5.2.2 Underinvestment**

The second objective of the study was to assess the effects of underinvestment cost on hedging practices of non-financial firms listed on NSE. Four proxies for a firm's probability of underinvestment cost were used. A logistic regression analysis revealed that research and development and capital expenditure made significant contribution to prediction. However, price earnings ratio and market to book value had no statistically significant influence on firm hedging practices. Overall model results, it was established firms exposed to underinvestment costs are more likely to engage in hedging. The odd ratio for under investment cost was  $\{\text{Exp}(\beta) = 1.181\}$ , implying a unit increase in under investment cost leads 18.1% increase in odds of hedging financial risk.

### **5.2.3 Economies of Scale**

The third objective of the study was to assess the influence of economies of scale on hedging practices of non-financial firms listed on NSE. Four proxies for a firm's probability of underinvestment cost were used. A logistic regression analysis revealed that larger firms in terms of total sales and total assets exhibit a higher propensity to hedge financial risks as compared to smaller firms. Firm's market capitalization was not statistically significant predictor. From the overall model results, it was found that economies of scale had positive influence on firms hedging practices. The odd ratio for economies of scale was  $\{\text{Exp}(\beta) = 1.486\}$ , implying a unit increase in under investment cost leads 48.6% increase in odds hedging financial risk.

#### **5.2.4 Foreign Exposures**

The fourth objective of the study was to assess the influence of foreign exposure on hedging practices of non-financial firms listed on NSE. A logistic regression analysis was conducted on the proxies for foreign exposure. Out of the four proxies, foreign revenue, subsidiary abroad and foreign debt made significant contribution to prediction. Firm's foreign cost was not statistically significant predictor. From the overall model results, it is evident that foreign exposure had a substantial positive influence on firms hedging practices. The odd ratio for foreign exposure was  $\{\text{Exp}(\beta) = 1.822\}$ , implying a unit increase in foreign exposure leads to 82.2% increase in odds of hedging financial risk.

#### **5.2.4 Managerial Risk Aversion**

The fifth objective of the study was to assess the influence of managerial risk aversion on hedging practices of non-financial firms listed on NSE. From the results, it was established only management compensation proxy of managerial risk aversion influenced firms hedging practices. Management ownership and structure of share ownership were not statistically significant influencers of firm hedging practices. Managers engage in the hedging when they are exposed to a certain high risk in their firm operations to protect the company's benefits regardless to the portion of shareholding by them. From the overall model results, it was established that there exist a positive relationship between high managerial risks aversion and hedging practices. The odd ratio for managerial risk aversion was  $\{\text{Exp}(\beta) = 1.088\}$ , implying a unit

increase in managerial risk aversion leads to 8.8% increase in odds of hedging financial risk.

### **5.3 Conclusions**

Non-financial firms listed on NSE face myriad financial risks ranging from foreign exchange risks, interest rate risk and commodity price risk, in that order of severity. As a result, these non-financial firms have adopted both derivative and non-derivative hedging practices. The most prevalent derivative instrument used by the non-financial firms is forward contracts followed by swaps then futures. However, some non-financial firms do not extensively hedge using derivatives as they feel that exposures are more effectively managed by other means (non-derivative use) and some feel that they are insufficiently exposed to financial risks.

The study concludes that financial distress has a positive relationship with firms hedging practices. While liquidity, leverage and interest coverage had significant effect on their hedging practices; profitability was not a statistically significant predictor. On underinvestment cost, R&D cost and capital expenditure proxies significantly and positive influence their hedging practices while price earnings ratio and market to book value proxies were not statistically significant predictor. In terms of scale economies, gross sales and assets significantly influenced hedging financial risk practices.

The study further concludes that foreign revenue, operations and debt has significant prediction on firms' hedging practices. However, foreign cost was not a statistically significant predictor. Besides, firm hedging practices were motivated by management

compensation and not management ownership and ownership structure. That is, hedging strategy choice depended on managerial risk aversion outcomes such as bonus remuneration system.

#### **5.4 Recommendations**

From the findings and conclusion a number of recommendations have been put forward. To begin with, most firms do not have a deliberate policy on hedging and management of financial risks is solely left to the devices and whims of managers which make investors incur agency costs. There is, thus, a need for organization wide policy on hedging and derivative use to act as an operation manual for the managers and firms' agents. Given the low trading volume of derivatives in Kenya compared to developed countries, market players should be educated on use of derivatives instruments to minimize risk.

The management would realize that underinvestment problem can be alleviated by rewriting or renegotiating debt contracts, shortening the maturity of outstanding debt, or issuing less debt, but these remedies create additional costs. Corporate hedging can reduce the risk of investment projects failure less making it less likely for firm to find themselves in underinvestment problem. To minimize foreign exchange exposure, non-financial firms can issue invoices in foreign currency and have favorable mix of foreign currencies.

The study advocates for speedy establishment of derivative market in Kenya together with its ancillary regulatory framework that would protect market participants.



Educational programs on derivatives should be developed and undertaken in Kenya to demystify derivative trading and its accounting and valuation procedure. This would mitigate against managers skepticism on derivative use. Additionally, it is recommended that there is need for building upon existing financial derivatives instruments so as to enhance efficiency and effectiveness in their use in Kenya as modern tools for financial risk management.

Based on these recommendations, the study's findings might help CMA to encourage companies in Kenya in accepting derivative use thus developing the nascent market in the country. The study advocates for speedy establishment of derivative market in Kenya together with its ancillary regulatory framework that would protect market participants. Educational programs on derivatives should be developed and undertaken in Kenya to demystify derivative trading and its accounting and valuation procedure. CMA, basing on findings of this study, would make the necessary policies that enhance uptake of derivatives.

The study would be a valuable document for management of non-financial firms listed at the NSE in a number of ways. Senior finance officers of non-financial firms will find the study useful as they would gain an insight on how hedging practices would help their firms survive period of financial distress as evidenced by liquidity problems and high profitability volatility. The finance offices would also understand the disadvantages and advantages of each hedging practice. The study would create awareness for non-financial firms towards foreign exchange exposure. The products available for financial

hedging are perceived to be comprehensive and in-depth. Firms are assertive towards financial derivatives products, and also regulatory bodies.

The study is significant to investors because as the global market become volatile, various risks arise from exchange rates movements, commodity price fluctuations, and interest rates changes, among others that affect companies, and hence pose a threat to their investment portfolios. Thus, investors will benefit from good risk mitigation and management strategies which the study seeks to establish. Proper use of the findings would be invaluable in safe guarding investors' investments against risk.

### **5.5 Areas for Further Research**

This study has revealed the determinants of financial risk management using derivatives in non-financial firms whereby it illustrated the financial distress, underinvestment cost, economies of scale, foreign exposure and managerial risk aversion affected such practices. These findings, however were generalized about non-financial firms listed on the NSE and might not be extrapolated to include firms not listed on the NSE as they considerably have different control measures which might affect their risk management.

The study therefore, recommends that a comprehensive research that covers both listed and non listed non finance firms by seeking to establish the determinants of financial risk hedging practices so as to get a holistic picture of factors affecting financial risk hedging practices. This holistic approach would have wide applications to firms. Furthermore, the repetition of this study in the near future is expected to lead to valuable

conclusions as to the evolution of risk management by Kenyan non-financial firms through time, both in quantitative and qualitative terms.

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## 113. APPENDICES

### **Appendix I: Letter of Introduction**

Dear Respondent,

#### **RE: RESEARCH DATA COLLECTION**

I am a postgraduate student of Jomo-Kenyatta University of Agriculture and Technology (JKUAT) pursuing a Doctor of Philosophy in Finance. I am currently collecting data for my research project on **Determinants of Financial Risks Hedging Practices among Non-Financial Firms Listed at the Nairobi Securities Exchange**.

In view of the above, I humbly request you to cooperate in answering the questions in the questionnaires attached here-with. Kindly read the accompanying instructions and respond to the questions as provided for. I also request you to provide me with the necessary documentation and information regarding hedging practices of your firm. This will help me collect the necessary data which will help me in carrying out the analysis, hence, achieve the objectives of the study.

The information that you will provide will remain confidential and it will be used exclusively for this research and not for any other purpose whatsoever. Your response and cooperation in this matter will be highly appreciated.

Thank you in advance,

Yours Faithfully,

Christopher Mutembei

## Appendix II: Questionnaire

Serial No.	
------------	--

**Instructions:** (Please read the instructions given and answer the questions as appropriately as possible). It is advisable you answer or fill in each section as provided. Make an attempt to answer every question fully and correctly.

### SECTION A: GENERAL INFORMATION

1) Name of the company\_\_\_\_\_

2) The sector your company is operating

Agricultural	[ ]
Trading	[ ]
Manufacturing	[ ]

3) In general, to what extent do the following financial risks affect your company's operations

	Not at all	Less Extent	Moderate Extent	High Extent	Very High Extent
Foreign exchange risks					
Interest rate risks					
Commodity price risks					

### PART B: HEDGING PRACTICES OF THE FIRM

4) Does your company Hedge financial Risk exposures using derivatives?

YES [ ]
---------

NO

**If No go to Question 7**

5) What kinds of derivatives does the company use to manage financial risk exposures?  
 (Tick the most applicable for every hedging strategy)

	Not at all	To manage FX exposure	To manage interest rate exposure	To manage Commodity price Exposure
Forwards				
Futures				
Swaps				
Options				

Any other (please specify),  
 .....  
 .....

6) What is the relative importance of each hedging objective listed below when using derivatives to manage financial risk?

	Not important	Less Important	Somewhat Important	Important	Very important
Reduce cash flow Volatility					
Reduce accounting earning volatility					
Stabilizes market value of the firm					
Ensure the survival of the firm					

Any other (please specify):

.....  
 .....  
 .....

7) What are your main concerns when considering the use of derivative for financial risk management purposes?

	No Concern	Low Concern	Moderate Concern	High Concern	Very High Concern
Difficulty in quantifying underlying exposure					
Concerns about accounting treatment					
Overall costs					
Concerns about the perception					
Volatility in risk exposure					
Getting the right mix of derivatives					

8) If your company does not hedge financial risks, please indicate the reasons (Tick all that applies)

Reason	Tick
Insufficient exposure to financial risks	
Exposures are more effectively managed by other means	
Disclosure requirement of the IFRS	
Costs of establishing and maintain a derivative program exceed the expected benefits	
Management scepticism against derivative use	
Derivative instruments and its market not fully developed in the country	

9) What do you think needs to be done to strengthen the company's hedging practices against financial risk?

.....  
 .....

.....  
.....

**SECTION C: FINANCIAL DISTRESS AND HEDGING**

10) In your opinion what is the extent of liquidity position of your firm?

Negative [ ]	Low [ ]	Moderate [ ]	High liquidity [ ]	Very High liquidity [ ]
-----------------	------------	--------------	-----------------------	-------------------------------

11) Kindly rate the Leverage position of the firm?

Very Low [ ]	Low [ ]	Moderate [ ]	High [ ]	Very High [ ]
-----------------	------------	-----------------	-------------	------------------

a. Please indicate whether your firm has ever defaulted in its debt payment?

YES [ ]
NO [ ]

12) In your opinion, what is the profitability level of the firm?

Loss [ ]	Low [ ]	Moderate [ ]	High [ ]	Very High [ ]
----------	---------	--------------	----------	---------------

a. Has your company been consistent has in paying dividends over last 5 years

YES [ ]
NO [ ]

b. If No why

.....  
.....  
...

13) In your opinion, what is the Interest Coverage level of the firm?

Very Low [ ]	Low [ ]	Moderate [ ]	High [ ]	Very High [ ]
--------------	---------	--------------	----------	---------------

**SECTION D: UNDERINVESTMENT COST AND HEDGING**

14) Please indicate the proportion of your firm's expenditure on research and development expenses to total sales?

None [ ]	1 – 5% [ ]	6 – 10% [ ]	11 – 15% [ ]	More than 15% [ ]
----------	------------	-------------	--------------	-------------------

15) Please indicate the proportion of your firm's capital expenditure to total assets?

None [ ]	1 – 5% [ ]	(6 – 10%) [ ]	11 – 15% [ ]	More than 15% [ ]
----------	------------	---------------	--------------	-------------------

16) Please indicate the proportion of your firm's price Earnings Ratio ?

Below 0 [ ]	1 – 10% [ ]	(11 – 20%) [ ]	21 – 30% [ ]	More than 30% [ ]
-------------	-------------	----------------	--------------	-------------------

17) What is the current market value analysis of your firm?

Highly Underpriced [ ]	Underpriced [ ]	Market & Book Value are Equal [ ]	Overpriced [ ]	Highly Overpriced [ ]
------------------------	-----------------	-----------------------------------	----------------	-----------------------

**SECTION E: ECONOMIES OF SCALE AND HEDGING**

18) What is the company's average annual turnover?

< 1 Billion [ ]	1 to 10 Billion [ ]	11 to 100 Billion [ ]	101 to 200 Billion [ ]	More than 200 Billion [ ]
-----------------	---------------------	-----------------------	------------------------	---------------------------

19) What is the average range of the total asset value of the company?

< 1 Billion [ ]	1 to 10 Billion [ ]	11 to 100 Billion [ ]	101 to 200 Billion [ ]	More than 200 Billion [ ]
-----------------	---------------------	-----------------------	------------------------	---------------------------

20) What is the total market capitalization's of the company?

< 1 Billion [ ]	1 to 10 Billion [ ]	11 to 100 Billion [ ]	101 to 200 Billion [ ]	More than 200 Billion [ ]
-----------------	---------------------	-----------------------	------------------------	---------------------------

**SECTION F: FOREIGN EXPOSURE AND HEDGING**

21) Kindly indicate the proportion of your company’s consolidated foreign sales.

None (0%) [ ]	1 to 20% [ ]	21 to 40% [ ]	41 to 60 % [ ]	61% and Above [ ]
---------------	--------------	---------------	----------------	-------------------

Kindly comment on the extent to which your foreign sales are exposed to foreign exchange risks

.....  
 .....  
 .....  
 .....

22) Kindly indicate the proportion of your company’s foreign operating purchases.

None (0%) [ ]	1 to 20% [ ]	21 to 40% [ ]	41 to 60 % [ ]	61% and Above [ ]
---------------	--------------	---------------	----------------	-------------------

a) Kindly comment on the extent to which your purchases are exposed to foreign exchange risks

.....  
 .....  
 .....  
 .....

23) Does your company has subsidiaries abroad?

None [ ]	1 to 5 [ ]	6 to 10% [ ]	11 to 15 % [ ]	More than 15 [ ]
----------	------------	--------------	----------------	------------------

24) How much foreign debt in relation to total debt does your company approximately have? Kindly answer by indicating the extent of foreign debt ratio



None (0%) [ ]	1 to 20% [ ]	21 to 40% [ ]	41 to 60 % [ ]	61% and Above [ ]
---------------	--------------	---------------	----------------	-------------------

**SECTION G: MANAGERIAL RISK AVERSION AND HEDGING**

25) What proportion of the company shares is owned by the management and directors?

None [ ]	1 to 5% [ ]	6 – 10% [ ]	11 to 20% [ ]	More than 20% [ ]
----------	-------------	-------------	---------------	-------------------

26) What is the structure of ownership of your firm?

Family [ ]	Individual [ ]	Institutional Investors [ ]	States Agencies [ ]	Mixed Shareholding [ ]
------------	----------------	-----------------------------	---------------------	------------------------

27) How does your firm compensate the senior management ?

Salary only [ ]	Salary & Bonus Only [ ]	Salary & share Options [ ]	Salary Bonus & Share Options [ ]
-----------------	-------------------------	----------------------------	----------------------------------

**Thanks for Your Kind Response**

**Appendix III: Document Analysis Guide**

Company: .....

<b>Variables</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
Derivative Uses					
Dividend Payout Ratio					
<b>Financial Distress</b>					

Short term liability					
Current Assets					
<b>Current Ratio</b>					
Earnings before Interest and Taxes (EBIT)					
Interest Expenses					
<b>Interest Coverage Ratio</b>					
Total Dividends					
Retained Earnings					
<b>Dividend Payout Ratio</b>					
<b>Net Cashflows</b>					
Total Debt					
Total Equity					
<b>Gearing Ratio</b>					
EBIT					
Sales					
<b>Profitability</b>					
<b>Underinvestment Cost</b>					
Total Dividends					
Retained Earnings					
<b>Dividend Payout Ratio</b>					
Expenditure on research and development					
<b>R&amp;E to Sales</b>					
Capital Expenditure					
<b>Capital Expenditure to total sales</b>					
<b>Market-to-Book Value Ratios</b>					
<b>Company Size</b>					
Share Market Prize					
Number of Outstanding shares					
<b>Market Capitalization</b>					
Total Assets					
<b>Log of Total Sales</b>					
Total Annual Sales					
<b>Log of Annual sales</b>					
<b>Foreign Exposure</b>					
Foreign Sales					
<b>Foreign Sales to Annual Sales Ratio</b>					
Foreign Purchases					
<b>Foreign Purchases to Total Purchases</b>					
<b>Foreign Operations (subsidiary) Dummy</b>					
<b>Foreign Loan Dummy</b>					
<b>Managerial Risk Aversion</b>					
Management Ownership					

Share options					

#### **Appendix IV: Operationalization of Variables**

The Operationalization framework consisted of a systematic elaboration of how the dependent and independent variables were measured.

<b>Variable</b>	<b>Variable Type</b>	<b>Measurement ( items)</b>	<b>Type of Analysis</b>
Hedging Practices	Dependent	<ul style="list-style-type: none"> <li>• Forwards</li> <li>• Futures</li> <li>• Swaps</li> <li>• Options</li> </ul>	Descriptive <ul style="list-style-type: none"> <li>• Means</li> <li>• Frequencies</li> </ul>
Financial Distress	Independent	<ul style="list-style-type: none"> <li>• Liquidity</li> <li>• Leverage</li> <li>• Profitability</li> <li>• Interest cover</li> </ul>	Descriptive <ul style="list-style-type: none"> <li>• Means</li> <li>• Frequencies</li> </ul> Inferential statistics <ul style="list-style-type: none"> <li>• Logit Regression</li> </ul>

<b>Variable</b>	<b>Variable Type</b>	<b>Measurement ( items)</b>	<b>Type of Analysis</b>
Under Investment Cost	Independent	<ul style="list-style-type: none"> <li>• Research &amp; Development Expenditure</li> <li>• Capital Expenditure</li> <li>• Price Earnings Ratio</li> <li>• Market to book value</li> </ul>	Descriptive <ul style="list-style-type: none"> <li>• Means</li> <li>• Frequencies</li> </ul> Inferential statistics <ul style="list-style-type: none"> <li>• Logit Regression</li> </ul>
Economies of Scale	Independent	<ul style="list-style-type: none"> <li>• Total Sales</li> <li>• Total Assets</li> <li>• Market Capitalization</li> </ul>	Descriptive <ul style="list-style-type: none"> <li>• Means</li> <li>• Frequencies</li> </ul> Inferential statistics <ul style="list-style-type: none"> <li>• Logit Regression</li> </ul>
Foreign Exposure	Independent	<ul style="list-style-type: none"> <li>• Foreign Revenue</li> <li>• Foreign purchases</li> <li>• Foreign operations</li> <li>• Foreign Loans</li> </ul>	Descriptive <ul style="list-style-type: none"> <li>• Means</li> <li>• Frequencies</li> </ul> Inferential statistics <ul style="list-style-type: none"> <li>• Logit Regression</li> </ul>
Managerial risk aversion	Independent	<ul style="list-style-type: none"> <li>• Managerial ownership</li> <li>• Managerial Compensation</li> <li>• Structure of ownership</li> </ul>	Descriptive <ul style="list-style-type: none"> <li>• Means</li> <li>• Frequencies</li> </ul> Inferential statistics <ul style="list-style-type: none"> <li>• Logit Regression</li> </ul>

### Appendix V: Descriptive Statistics of Secondary Data

<b>Description</b>	<b>N</b>	<b>Minimum</b>	<b>Mean</b>	<b>Maximum</b>	<b>Standard Deviation</b>
Quick Ratio	37	0.08	0.68	3.32	0.64
Current Ratio	37	0.24	0.87	4.54	0.76
Debt to Capital Ratio	37	0.00	31.98	634.5	47.02
Return on Assets	37	-15.16	7.9	21.30	6.8
interest coverage ratio	37	-20.63	16.96	100.00	26.48
Dividend Payout	37	0.00	3.59	8.65	1.64
Research &Development	37	0.00	3.56	194.27	16.66
Capital expenditure	37	0.00	0.08	2.33	0.17
Market-to-book ratio	37	-9.45	4.16	164.33	11.14
Total Sales (Natural log)	37	1.34	4.75	8.16	1.36
Total assets (Natural log)	37	2.43	5.66	10.27	1.52
Market value (Natural log)	37	4.17	6.36	10.36	1.28
Foreign Revenue	37	0.00	36.05	96.00	31.80
Foreign Purchase	37	0.00	29.31	92.20	28.25
Foreign Operation Dummy	37	0.00	0.77	1.00	0.42
Foreign Loan dummy	37	0.00	0.65	1.00	0.31

## Appendix VI: List of Respondent

S/N	Company Name
1.	A.Buamann &co Ltd
2.	Access Kenya Group
3.	Athi-River Mining Limited
4.	Bamburi Cement Company Limited
5.	BOC Kenya Limited
6.	British American Tobacco Kenya Limited
7.	Car and General (Kenya) Limited
8.	Carbacid Investment Company
9.	CMC Holdings Limited
10.	Crown-Berger Kenya Limited
11.	Eaagads Limited
12.	East African Breweries Limited
13.	East African Cables Limited
14.	East African Portland Cement Company
15.	Eveready East Africa Limited
16.	Express Kenya Limited
17.	Hutchings Biemer Ltd
18.	Kakuzi Limited
19.	Kapchorua Tea Company Limited
20.	Kenya Airways Limited
21.	Kenya Electricity Generating Company Limited
22.	Kenya Oil Company Limited
23.	Kenya Power and Lighting Company Limited
24.	Limuru tea Company Limited
25.	Marshalls Limited
26.	Mumias Sugar Company Limited
27.	Nation Media Group Limited
28.	Rea Vipingo Plantations Ltd
29.	Safaricom Limited
30.	Sameer Africa Limited
31.	Sasini Tea Limited
32.	Scangroup Limited
33.	Standard Group Limited
34.	Total Kenya Limited
35.	Tourism Promotion Services Eastern Africa Ltd

36.	Uchumi Limited
37.	Unga Group Limited
38.	Umeme ltd
39.	Williamson Tea Kenya Limited

**Appendix VII: Logistic Regression Output for Financial Distress**

**Omnibus Tests of Model Coefficients**

	Chi-square	Df	Sig.
Step	35.545	4	.000
Step 1 Block	35.545	4	.000
Model	35.545	4	.000

**Model Summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	15.721 <sup>a</sup>	.617	.823

**Hosmer and Lemeshow Test**

Step	Chi-square	df	Sig.
1	1.816	7	.969

**Classification Table<sup>a</sup>**

	Observed	Predicted		
		Hedging		Percentage Correct
		No	Yes	
Step 1	Hedging No	15	3	83.3
	Hedging Yes	1	18	94.7
	Overall Percentage			89.2

a. The cut value is .500

**Appendix VIII: Logistic Regression Output for Underinvestment Cost**

**Omnibus Tests of Model Coefficients**

	Chi-square	df	Sig.
Step	24.915	4	.000
Step 1 Block	24.915	4	.000
Model	24.915	4	.000

**Model Summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	26.351 <sup>a</sup>	.490	.654

**Hosmer and Lemeshow Test**

Step	Chi-square	df	Sig.
1	10.332	7	.171

**Classification Table<sup>a</sup>**

	Observed	Predicted		
		Hedging		Percentage Correct
		No	Yes	
Step 1	Hedging No	15	3	83.3
	Hedging Yes	4	15	78.9
	Overall Percentage			81.1

a. The cut value is .500



**Appendix IX: Logistic Regression Output for Economics of Scale**

**Omnibus Tests of Model Coefficients**

	Chi-square	df	Sig.
Step	26.841	3	.000
Step 1 Block	26.841	3	.000
Model	26.841	3	.000

**Model Summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	24.425 <sup>a</sup>	.516	.688

**Hosmer and Lemeshow Test**

Step	Chi-square	df	Sig.
1	12.318	7	.091

**Classification Table<sup>a</sup>**

	Observed	Predicted		
		Hedging		Percentage Correct
		No	Yes	
Step 1 Hedging	No	16	2	88.9
	Yes	1	18	94.7

Overall Percentage			91.9
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a. The cut value is .500

### Appendix X: Logistic Regression Output for Foreign Exposure

#### Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	34.883	4	.000
Step 1 Block	34.883	4	.000
Model	34.883	4	.000

#### Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	16.383 <sup>a</sup>	.610	.814

#### Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	8.082	7	.325

#### Classification Table<sup>a</sup>

	Observed	Predicted		
		Hedging		Percentage Correct
		No	Yes	

Step 1	Hedging	No	16	2	88.9
		Yes	2	17	89.5
	Overall Percentage				89.2

a. The cut value is .500

### Appendix XI: Logistic Regression Output for Managerial Risk Aversion

#### Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	23.425	3	.000
Step 1 Block	23.425	3	.000
Model	23.425	3	.000

#### Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	27.841 <sup>a</sup>	.469	.626

#### Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	5.920	7	.549

**Classification Table<sup>a</sup>**

	Observed	Predicted		
		Hedging		Percentage Correct
		No	Yes	
Step 1	Hedging No	16	2	88.9
	Hedging Yes	2	17	89.5
	Overall Percentage			89.2

a. The cut value is .500

**Appendix XII: Logistic Regression Multivariate Logit Model**

**Omnibus Tests of Model Coefficients**

	Chi-square	df	Sig.
Step	33.107	5	.000
Step 1 Block	33.107	5	.000
Model	33.107	5	.000

**Model Summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	18.159a	.591	.789

**Hosmer and Lemeshow Test**

Step	Chi-square	df	Sig.
1	3.914	8	.865

**Classification Table**

	Observed	Predicted		
		Hedging		Percentage Correct
		No	Yes	
Step 1	Hedging No	16	2	88.9
	Yes	3	16	84.2
	Overall Percentage			86.5

a. The cut value is .500