

**A COMPARATIVE ANALYSIS OF STOP-LOSS AND BUY-AND-HOLD  
STRATEGIES AT THE NAIROBI SECURITIES EXCHANGE**

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## DECLARATION

This research project is my original work and has not been submitted for the award of a degree at the University of Nairobi or any other University.

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This research project has been submitted for the examination with my approval as the candidate's Supervisor.

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## **DEDICATION**

This research project is dedicated to my parents James and Emily Muriuki who have been an immense source of encouragement in my life and have played a huge role to ensure that I complete this thesis.

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

<b>ARM</b>	Athi River Mining
<b>BH</b>	Buy-and-Hold
<b>EMH</b>	Efficient Market Hypothesis
<b>FTSE</b>	Financial Times Stock Exchange
<b>IFC</b>	International Finance Corporation
<b>NASI</b>	Nairobi Securities Exchange All Share Index
<b>NSE</b>	Nairobi Securities Exchange
<b>NSE 20</b>	Nairobi Securities Exchange 20 Share Index
<b>SL</b>	Stop-Loss

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## ABSTRACT

The purpose of this study is to conduct a comparative analysis of stop-loss and buy-and-hold strategies by investigating if the stop-loss strategies outperform the buy-and-hold strategies. The evaluation criteria of whether stop-loss strategies can deliver better results are defined as cumulative and mean returns. The study is conducted on daily returns data for stocks listed on the NSE 20 Share Index during the time period between January 2000 and December 2014 divided into holding periods of one year. We choose the beginning of each year as an arbitrary starting date for the holding periods. The performance of stop-loss strategies is tested by the trailing stop-loss where a stock is sold if the price reaches a certain percentage below the highest price since the starting date. The tested stop-loss strategies are 10%, 15%, 20%, 25% and 30% stop-loss strategies. We find only the 30% stop-loss strategy outperforming the buy-and-hold portfolio strategy. This means that a stock is sold if it declines by 30% from its highest price during the holding period in-order to limit on losses. During the bearish years all the stop-loss strategies outperformed the buy-and-hold strategy. However, during the bullish years, the buy-and-hold strategy outperformed the stop-loss strategies. The stop-loss strategies perform in a more effective and consistent fashion when it comes to minimizing stock return variances. The study therefore recommends the application of stop-loss strategies to a stock portfolio in order to minimize losses especially during market downturns.

## **CHAPTER ONE: INTRODUCTION**

### **1.1 Background of the Study**

Stock markets are volatile. Price changes of several percentage points within a short period are common in the stock markets. During unexpected stock market falls, investors prioritize to minimize losses. One of the methods used by practitioners are stop-loss strategies which are considered to be a powerful tool to minimize losses and improve portfolio performance. Stop-loss strategies are also a built-in feature in many trading softwares on the market (Leoni 2009).

The strongest theoretical argument against the stop-loss strategies and for the buy-and-hold strategy is Efficient Market Hypothesis (EMH). According to EMH stock prices follow a random walk stating that it is impossible to be able to predict if selling a declining investment before the end of the holding period is a better choice then to wait until the end of the holding period as in the buy-and-hold strategy. By selling before the end of a holding period the investor protects him/herself from further losses, but also deprives him/herself the potential stock price improvement during the remaining time of the holding period (Snorrason & Yusupoc 2009).

Stocks at the Nairobi Securities Exchange (NSE) are difficult to forecast and trading is not costless, therefore there is the risk of losing money. An investor can either miss a full upside by selling too soon, or taking a huge loss by holding a falling stock too long. Majority of investors don't know when to sell a falling stock. On the other hand, some investors make use of portfolio strategies to exit and re-enter investments to make less risky gains. This chapter introduces two portfolio strategies used to cut back on losses in a stock portfolio.

#### **1.1.1 Stop-Loss Strategy**

A stop-loss strategy is an active investment strategy in which an investor sells a stock when it reaches a certain price in order to limit the amount of loss from a declining stock. The stop-

loss strategy is recommended by specialists as a powerful tool to minimize losses and improve portfolio performance (Lei 2009). A stop loss strategy allows an investor to specify a condition under which a losing investment is automatically sold. Because investors do not have to make contemporaneous selling decisions, stop loss strategies can possibly prevent the behavioral biases and help investors to realize their losses sooner. Stop loss strategies are also touted in practice to improve investment returns (Lo 2007). On the other hand, they may not be efficient. If security returns are predictable, stop loss strategies fail to incorporate relevant information from the time a strategy is set to the time the contingent sell order is executed. When security returns are unpredictable, selling a losing investment before the end of a holding period does not guarantee that an investor will be better off at the end of this holding period. Although the investor will not incur any further loss on the specific investment, he also gives up the opportunity that this investment may recover during the rest of his holding period.

There are two types of stop-loss strategies, one is the trailing stop-loss and the second is the regular stop-loss. A trailing stop-loss is a stop-loss order set at a certain percentage below the market price and then adjusted as the price rises. A regular stop-loss is a stop-loss order set at a certain fixed percentage and could be manually re-adjusted by the trader. The trailing stop-loss offers a clear advantage in that it is more flexible than a regular stop-loss. It is an attractive alternative because it allows the trader to continue protecting his capital if the price drops. But as soon as the price increases, the trailing feature kicks in, allowing for an eventual protection of profit while still reducing the risk to capital.

Despite the acceptance of stop-loss strategies among a large group of practitioners and advisers, stop-loss strategies is not a topic of consensus among academics. The debaters addressing the issue have been becoming ever more categorical in their preference for the buy-and-hold portfolio strategy or for more active strategies.

### **1.1.2 Buy-and-Hold Strategy**

A buy-and-hold strategy is a passive investment strategy in which an investor buys stocks and holds them for a long period of time, regardless of fluctuations in the market. An investor

who employs a buy-and-hold strategy actively selects stocks, but once in a position, is not concerned with short-term price movements and technical indicators. True buy-and-hold investing is the careful selection of an appropriate balance of assets for your portfolio, with the intent to hold those assets until either you need the money or your investment needs change. Based on the allocation of assets in the portfolio, this style of investing can be very conservative or very aggressive. The most aggressive buy-and-hold approach is 100 percent in equities; the most conservative is 100 percent in fixed-income. A true buy-and-hold approach does not sell securities to lock in gains or to cut losses. Instead, on a quarterly or annual basis, the portfolio is rebalanced to return to the established asset balance. Rebalancing requires selling assets that have performed the best - and become an out-sized proportion of the portfolio - and buying asset classes that have underperformed. It's the opposite of the old Wall Street adage, "Let your profits run and cut your losses short," but it does have the advantage of forcing you to "Buy low and sell high".

Some of the advantages of buy-and-hold strategies are, with a buy-and-hold portfolio, you should have minimal investment expenses. Other than re-balancing or adding additional funds, there will be little on-going trading costs and management fees are minimal. Buy-and-hold investing offers greater tax efficiency. Gains on securities will tend to be capital gains, reducing tax liabilities. Unrealized capital gains that are passed on to your portfolio will do so on a stepped-up basis, eliminating taxes on that appreciation. You will still incur tax liabilities for mutual fund distributions and periodic re-balancing, but overall, assets will be held longer.

The number one reason many investors under-perform when attempting to use a buy-and-hold investment approach is the emotional demand this approach makes. At one time or another, buy-and-hold investors will lose money. Possibly a lot of money. Even if you philosophically accept the risk of buy-and-hold investing, it's a different matter when your net worth begins to steadily erode with a downtrend in the market. Most investors find themselves unable to hold for the long term and inevitably sell at the worst time.

### **1.1.3 Relationship between Stop-Loss and Buy-and-Hold Strategies**

Stop-loss strategies and Buy-and-hold strategies are both used as portfolio management tools by investors. Stop-Loss strategy is an exit strategy that cuts on losses and locks in profits while Buy-and-hold strategy is a strategy of measuring long-term performance. The Buy-and-hold strategy is mainly applied by value investors who have various systems when deciding when and if to invest in a stock. Stop-Loss strategies on the other hand allows decision making to be free from any emotional influences.

### **1.1.4 The Nairobi Securities Exchange**

The Nairobi Securities Exchange (NSE) was constituted as a voluntary association of stock brokers registered under the Societies Act in 1954 and in 1991 the NSE was incorporated under the Companies Act of Kenya as a company limited by guarantee and without a share capital. Subsequent development of the market has seen an increase in the number of stockbrokers, introduction of investment banks, establishment of custodial institutions and credit rating agencies. In addition, the number of listed companies have also increased over time. Securities traded include, equities, bonds and preference shares.

There are two indices that are popularly used to measure the performance of the NSE, i.e., the NSE 20 Share Index and the NSE All Share Index (NASI). The former has been in use since 1964. It measures the performance of 20 blue-chip companies which are considered to have the strongest fundamentals. This index primarily focuses on price changes amongst these 20 companies. In 2008, the NSE All Share Index (NASI) was introduced as an alternative index. It is a measure of overall market performance. The Index incorporates all the traded shares of the day. Its focus is therefore the overall market capitalization rather than the price movements of select counters

The NSE 20 historical trend is volatile nature. The lowest performance between the year 2000 and 2014 was in the year 2002 mainly due to political instability and the election period in the that year. There was however a notable increasing trend for the period 2003-2007 due to the political stability after the general election and economic recovery in Kenya. However, a

downward slope was experienced after the year 2007 due to the post election violence that was experienced after the 2007 elections. Trading in the NSE thus deteriorated due to lack of investor confidence in the Kenyan economy.

## **1.2 Research Problem**

The dilemma of whether stop-loss strategies are efficient compared to the buy-and-hold strategy has far reaching implication for the market, individual investors and the financial theory. Expectations on stop-loss strategies efficiency reveal which theoretical ground one has chosen, Efficient Market Theory or Behavioural Finance (and/or Technical Analysis). Statistical and empirical evidence would show which of these theories mirrors reality more accurately. Whether or not stop-loss strategies are efficient compared to the buy-and-hold strategy is in turn determined by the price movement processes of the stocks and the two theories imply fundamentally different processes. (Snorrason & Yusupoc 2009)

Previous studies, although mostly conducted on simulated data, give hints on when stop loss strategies can add value to the return of the buy-and-hold strategy. Price movements that follow random walk or mean-reversion suggest that stop-loss strategies are inefficient. But if the price movements follow trends, i.e. have momentum, then stop loss rules can potentially save the investor from afflicting oneself large losses. Efficient Market Hypothesis claims that price movements follow a random walk, whereas Behavioural Finance is of the opinion that market price move in trends.

The NSE is a freely traded market which willing buyers trade with willing sellers without external intervention or impediment and therefore prices are as a result of supply and demand in real time (Olwal, 2012). The stock market has experienced a robust activity and high returns on investment culminating in the NSE being rated by the International Finance Corporation (IFC) as the best performing market in the world with a return of 179% in dollar terms (Ndegwa, 2006). The launch of the NSE All Share Index (NASI) in 2008 and the FTSE NSE indices in 2011 was the result of an extensive market consultation process with local asset owners and fund managers and the need to reflect the growing interest in new domestic investment and diversification opportunities in the East African region. These developments

have provided opportunities for investment in the stock market and thus a huge rise in fund managers in Kenya (Alum, 2006). The stock market is one of the most interesting areas for investors who always want to create massive wealth in the shortest time possible since stocks are the most wonderful category of financial instruments and one of the greatest tools ever invented for building financial wealth. This demonstrates the need for investment strategies that could assist investors come up with hard investment decisions.

Anyumba (2010) set out to test random walk for NSE-20 share index and NASI, using variance ratio test. The study concluded a random walk on NSE-20 share weekly and monthly indices and NASI weekly indices but random walk did not hold on NASI monthly indices. Although studies have been done on technical strategies versus buy-and-hold strategies ( Ngugi, 2014) the study did not compare specifically the stop-loss strategies with the buy-and-hold strategy. This study sought to add a new perspective to the discussion by comparing stop-loss strategies with buy-and-hold strategy. The study therefore attempts to answer the research question; Can stop-loss strategies outperform the buy-and-hold strategy at the NSE?

### **1.3 Research Objective**

The objective of this study is to conduct a comparative analysis of stop-loss and buy-and-hold strategies at the NSE.

### **1.4 Value of the Study**

This study should inform investors who actively manage their own investment of stocks on the NSE. It will point to the effectiveness of using a Technical Analysis approach, specifically the stop-loss strategy as opposed to using a Fundamental Analysis, specifically the buy-and hold strategy. It should not only inform individual investors but also corporate investors and fund managers who make investment decisions on behalf of others as to which method is more effective. Chartists, individuals who use charts and graphs of a security's historical prices to forecast its future trends are also expected to benefit from this study.

Moreover, this study will be helpful to technical analysts who look at the price movement of a security and use this data to predict its future price movements. Investors, fund managers, chartists and technical analysts will all collectively benefit from this by informing on when to sell a falling stock and when to hold a stock in the event that losses will not be incurred.

The NSE 20 Index shares are selected for this study mainly because they are trade-able and liquid. This means there is a large enough market to buy and sell shares, that is, there are no supply demand problems. The bulk of the value of shares traded daily on the NSE consists of the NSE 20 Index shares. This implies that the results will be applicable for a wide range of users: asset managers who manage large portfolios will be able to apply the stop-loss or buy-and-hold strategy to their trading on the NSE 20 Index.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

The section covers a review of theories related to this study. It also provides solid evidence of various scholars and researchers locally and globally. The study has highlights on the empirical studies in Kenya and other countries and a literature review addressing the gaps of the study.

### **2.2 Theoretical Review**

There exists some theories in the area of stop-loss and buy-and-hold strategies. Some important theories that relate to this subject include; Efficient Market Hypothesis, Behavioural Finance, Random Walk Theory to mention a few.

#### **2.2.1 Efficient Market Hypothesis**

In 1970, Fama defined the “efficient market” as a market is one in which security prices adjust rapidly to the arrival of new information and, therefore, the current prices of securities reflect all information about the security. Stock information holds not only the currently known information but also future rational expectations of the market participants and the only reason for a price to change is unexpected news and events. New information comes to the market at random, thus the price changes happen randomly as well. The frictionless market also interprets the information in the same way. Most of the market participants are assumed to act rationally with the aim to maximize their own utility. The minor group of investors that act irrationally, act so uncorrelated to each other, thus canceling each other's effect on the market prices. Therefore according to Efficient Market Hypothesis (EMH) it is impossible to outperform the market portfolio consistently by actively managing a portfolio of assets since there are no undervalued or overvalued stocks. The only way to outperform the market portfolio is by accepting higher risk. The EMH is subdivided into three types of market efficiency, depending on the type of the information that the market prices are assumed to reflect. The weak form of the EMH states that an investor can not consistently

outperform the market portfolio by just looking at the historical time series data of the stock prices. This means that for example the technical analysis is inefficient. The semi-strong version of the EMH states that investors can not consistently outperform the market portfolio by taking into account all publicly available information. This implies the inefficiency of the fundamental analysis. The most stringent form of the EMH is the strong form of market efficiency. This form of market efficiency states that stock prices always fully reflect all relevant information, including insider information not yet available to the public.

Stop loss order is one of the simplest instruments from the technical analysis' toolkit, because a stop loss order is linked to the behavior of a stock's or other asset's chart, without considering whether the fundamentals for the firm in question have changed. Under the EMH it should not be possible to outperform the market portfolio, the buy and hold strategy, using stop-loss rules or trailing stop-loss rules.

### **2.2.2 Behavioral Finance**

Behavioral Finance offers an alternative view on the market processes by taking inspiration from cognitive psychology. The cornerstone of Behavioural Finance is Prospect Theory by Psychologists Daniel Kahneman and Amos Tversky as a more realistic alternative to Expected Utility Theory and presented their paper in 1979. Prospect Theory was later extended by Thaler and Johnson (1990). According to Prospect Theory, individuals in the decision making focus not on the final wealth but on making gains and avoiding losses. Psychologists challenged that people participating in the markets are rational. They argued that people often suffer from cognitive and emotional biases and act in a seemingly irrational manner. Therefore, behavioral finance states that investors, especially individual investors, are incapable of solving dynamic optimization problems, in contrast to the assumption in the traditional financial theory. Heuristics, or rules of thumb, are used instead as means of coping with new information. Rules of thumb are used both because of the impossibility of the task of analyzing one by one the vast number of securities available to an investor today and because of psychological biases that investors systematically suffer from when making decisions. The finance field was reluctant to accept the view of psychologists who proposed

the behavioural finance model. Indeed, the early proponents of behavioural finance were regarded as heretics. As the evidence of the influence of psychology and emotions on decisions became more convincing, behavioural finance has received greater acceptance. Although there is disagreement about when, how, and why psychology influences investment decisions, the award of 2002 Nobel Prize in Economics to psychologists Daniel Kahneman and experimental economist Vernon Smith is seen by many as a vindication of the field of behavioural finance.

Over time, it has been noted that investors have a number of biases that negatively affect their investment performance. Advocates of behavioral finance have been able to explain a number of these biases based on psychological characteristics. A major documented bias is the propensity of investors to hold on to losing positions too long and sell “winners” too soon. The point is, investors fear losses much more than they value gains. This is explained by prospect theory, which contends that utility depends on deviations from moving reference points rather than absolute wealth. Another bias is overconfidence in forecasts, which causes analysts to overestimate growth rates for growth companies. Overconfidence in the investing field is common, especially for male investors, Barber and Odean (2001) and is found to worsen a portfolio's performance, because overconfidence leads to excessive trading. This frequent trading seems to be somewhat skewed toward winning investments though, because when dealing with their losing investments investors tend to keep the losers longer than they should, showing the so called disposition effect. Odean (1998). In addition, overemphasis is on good news for firms evaluated negative news is ignored, that is, they generally believe that the stocks of the growth companies they have analyzed will be “good stocks”. This is referred to as “confirmation bias”, where investors look for information that supports their prior opinion and decision. As a result, they tend to mis-value the stocks of these generally popular companies.

A study by Brown (1999), examined the effect of “noise traders” (nonprofessionals with no special information) on the volatility of closed-end mutual funds. When there is a shift in sentiment, these traders move heavily, which increases the prices and the volatility of these securities during trading hours. Also, Statman (1995), find that noise traders tend to follow

newsletter writers, who in turn tend to “follow the herd”; and these writers and “the herd” are almost always wrong, which contributes to excess volatility.

There is also “escalation bias” which causes investors to put more money into a failure that they feel responsible for rather than into a success. Shefrin (1999). This leads to the relative popular investor practice of “averaging down” on an investment that has declined in value since the initial purchase rather than consider selling the stock if it was a mistake. For example, if it was a buy at Kshs. 50, it is a screaming bargain at Kshs. 40. Obviously, the appropriate action is to go through a revaluation of the stock to determine if you missed some important bad news in your initial valuation (therefore, sell it and accept your loss) or confirm your initial valuation and acquire more of the “bargain”. The difficulty psychological factor is to seriously look for the bad news and consider the effects of that negative information on your prior valuation.

Behavioral finance challenges the assumptions underlying EMH. It does not agree that information is widely, cheaply and readily available to all investors. Instead, empirical evidence suggests that information dispersion occurs gradually, especially negative information. This in turn leads to underreaction in the market causing price trends. Hong, Lim, and Stein (2000)

Studies have shown that stocks exhibit short-term (3-12 months) momentum (Jegadeesh & Titman 1993, 1999) and longer-term (3-5 years) reversals (DeBondt & Thaler 1985; Lakonishok, Shleifer & Vishny 1994). The proposed explanation is style rotation. Market participants constantly switch from one style to another, from one type of stock to another, because a style that becomes too popular loses its profitability edge and falls into disfavor. Style rotation is, according to behavioral finance, a consequence of over and under-reaction of the investors subject to behavioral biases (Montier 2004). Swaminathan and Lee (2000) call the process “The Momentum Life Cycle”. The momentum life cycle hypothesis predicts that investors initially under-react to fundamental news about a stock, if the news is in contrast to the type of information (positive/negative) from previous longer periods, but after a while the investor majority recognizes the shift and overreacts to the news. The mechanism

leads to positive and negative momentum price movements for a given stock.

A slightly different explanation to a part of the momentum life cycle hypothesis, namely the reversal part, is reversal fear, suggested and tested empirically by Wang (2008). Reversal fear means that after a positive or negative trend, momentum, when the price of a stock has reached unusually high or low levels, investors become worried that the price level is not sustainable and fear that the price is about to reverse. Investors then start to change their positions to the opposite, causing the reversal.

When facing the market going against himself investors often act in one of the following ways. They can watch their investments decrease in value and first after extreme negative returns take a flight to safety by selling the risky investments and investing the proceeds in interest bearing assets, Agnew (2003). Other investors tend to become ever more risk-seeking and trade ever more aggressively in the same direction as before, trying to recoup the losses. Oberoi (2004) predicts that these investors will not stop until they have run out of funds.

Further, irrational investors do not act randomly cancelling each other's effects on the market prices as claimed by EMH, but rather often in the same direction, causing large mispricing on the market. The mispricing is not taken out by arbitrageurs because of the uncertainty in the market and high transaction costs, so that in effect there is no risk free arbitrage. These market irrationalities, mispricing, can last for a long period of time and aggravate under the period (Montier 2004). In fact, there are investors, like Soros, who are aware of mispricing on markets and often play in the direction of the mispricing and not against, thus aggravating the mispricing and giving hard time to arbitrageurs (Soros 1994).

Behavioral Finance adherents consider that future prices are not entirely random, due to the phenomenon of reflexivity. Market participants have expectations about the future. The expectations influence how the future will be. Therefore, it is not the rational market that through its rational expectations can correctly predict the future but it is the biased investors forming the future through their expectations.

Behavioral biases combined with the empirical evidence of persistence of both positive and negative price trends, for up to 12 months (Jegadeesh & Titman 1993,1999), means an investor that gets caught in a negative trend can suffer huge losses and stop loss rules could be a rational way to avoid the scenario. Stop loss rules could also be an effective tool in risk management and mitigating agency problems. Analysts suffer from both agency problems and behavioral biases, which result in over-optimism (Montier 2004). Traders employed by financial institutions can have a propensity to take on larger risks when trading for clients than with their own funds. Stop-loss rules could be rational to use also from the risk perspective. When stock prices go down they become more volatile, i.e. more risky (Jones, Walker & Wilson 2004). Empirical evidence shows also that stocks exhibit asymmetric correlations (Ang & Chen 2002). Correlations between stocks and the aggregate market are found to increase substantially when markets are sinking than when they are rising meaning that portfolio risk increases and thus diversification effect decreases (Montier 2004). Increased idiosyncratic volatility and stronger positive correlations between the stocks, i.e. higher risk, can make stop-loss rules attractive as means of controlling risk exposure. So there is potentially a gain to be made by reducing the risk of an investment and by that getting a higher risk-adjusted return, a thought also considered by Lei and Li (2009). Using stop-loss strategies investors can mitigate their own behavioral biases, and cope with the irrational market, so behavioral finance implicitly and explicitly suggests the use of stop-loss rules to be efficient.

### **2.2.3 Random Walk**

Random Walk Theory finds its origin in the early works of Bachelier (1900). Extended and Translated into English by Cootner (1964). This theory is the occurrence of an event determined by a series of random movements i.e. events that cannot be predicted. Applying the random walk theory to finance and stocks suggest that stock prices change randomly, making it impossible to predict stock prices. The random walk theory corresponds to the belief that markets are efficient and that it is not possible to beat or predict the market because stock prices reflect all available information and the occurrence of new information is seemingly random as well. The random walk theory is in direct opposition to technical

analysis which contends that a stock's future price can be forecasted based on historical information through observing chart patterns and technical indicators. Random Walk became popular and widely accepted as the approximation of stock price movements in 1960's and 1970's. Random Walk Hypotheses address the question of predictability of asset price movements. According to Random Walk Theory the prices cannot be predicted because the current price has already incorporated all available information. Only new pieces of information, which come randomly, can cause a price change. Price movements are thus unpredictable.

Now in an uncertain world the intrinsic value of a security can never be determined exactly. Thus there is always room for disagreement among market participants concerning just what the intrinsic value of an individual security is, and such disagreement will give rise to discrepancies between actual prices and intrinsic values. In an efficient market, however, the actions of the many competing participants should cause the actual price of a security to wander randomly about its intrinsic value. If the discrepancies between actual prices and intrinsic values are systematic rather than random in nature, then knowledge of this should help intelligent market participants to better predict the path by which actual prices will move towards intrinsic values. When the many intelligent traders attempt to take advantage of this knowledge, however, they will tend to neutralize such systematic behavior in price series. Although uncertainty concerning intrinsic values will remain, actual prices of securities will wander randomly about their intrinsic values. Of course intrinsic values can themselves change across time as a result of new information. The new information may involve such things as the success of a current research and development project, a change in management, a tariff imposed on the industry's product by a foreign country, an increase in industrial production or any other actual or anticipated change in a factor which is likely to affect the company's prospects. (Fama 1965)

In an efficient market, on the average, competition will cause the full effects of new information on intrinsic values to be reflected "instantaneously" in actual prices. In fact, however, because there is vagueness or uncertainty surrounding new information, "instantaneous adjustment" really has two implications. First, actual prices will initially over-

adjust to changes in intrinsic values as often as they will under-adjust. Second, the lag in the complete adjustment of actual prices to successive new intrinsic values will itself be an independent, random variable with the adjustment of actual prices sometimes preceding the occurrence of the event which is the basis of the change in intrinsic values (i.e., when the event is anticipated by the market before it actually occurs) and sometimes following.

This says that the "instantaneous adjustment" property of an efficient market implies that successive price changes in individual securities will be independent. A market where successive price changes in individual securities are independent is, by definition, a random walk market. Most simply the theory of random walks implies that a series of stock price changes has no memory—the past history of the series cannot be used to predict the future in any meaningful way. The future path of the price level of a security is no more predictable than the path of a series of cumulated random numbers.

It is unlikely that the random walk hypothesis provides an exact description of the behavior of stock market prices. For practical purposes, however, the model may be acceptable even though it does not fit the facts exactly. Thus although successive price changes may not be strictly independent, the actual amount of dependence may be so small as to be unimportant. What should be classified as unimportant depends, of course, on the question at hand. For the stock market trader or investor the criterion is obvious: The independence assumption of the random walk model is valid as long as knowledge of the past behavior of the series of price changes cannot be used to increase expected gains. More specifically, if successive price changes for a given security are independent, there is no problem in timing purchases and sales of that security. A simple policy of buying and holding the security will be as good as any more complicated mechanical procedure for timing purchases and sales. This implies that, for investment purposes, the independence assumption of the random walk model is an adequate description of reality as long as the actual degree of dependence in series of price changes is not sufficient to make the expected profits of any more "sophisticated" mechanical trading rule or chartist technique greater than the expected profits under a naive buy-and-hold policy. (Fama 1965)

### **2.3 Review of Empirical Studies**

Fama and Blume (1966) presented evidence supporting weak form market efficiency and the random walk theory. They studied 30 individual stocks listed on the Dow Jones Industrial Average (DJIA) over a six-year period. They found, after commissions, that only 4 of 30 securities had positive average returns. Furthermore, the rules they applied proved inferior to the BH strategy before commissions for all but two securities.

Bessembinder and Chan (1995) researched on technical trading strategies presented by Brock et al. (1992) in a variety of foreign markets in Latin America and Asia. The study found significantly higher profits using technical trading strategies than using the BH strategy in Malaysia, Thailand, Taiwan, Indonesia, Mexico and the Philippines.

Okoth (2005) tested whether contrarian investment strategy offer profitable opportunity at the NSE. After calculating the monthly returns and the winner and loser portfolios formed on the basis of their performance the study found that contrarian investment strategy offer profitable opportunities at the NSE especially in the short term.

Alum (2006) carried out a survey of the trading strategies employed by fund managers in Kenya. With a population of 15 fund managers in Kenya registered by the Capital Market Authority as at September 2005 a questionnaire centered on momentum, contrarian and BH strategies was set out that found out that fund managers rely on all strategies with the BH strategy being the most highly recognized.

Okello (2006) studied the 20 companies constituting the NSE 20 share index for three years from 1990 to 2002 to determine the profitability of filter rule test developed by Fama and Blue (1966) in the NSE. The study found that filter rules exist in NSE and with a filter between 4.3% and 4.9% investors can profit in the market by buying when stock price rise by a given percentage above its local low and selling when it falls by a particular percentage below its past local high.

In the working paper, "Thou Shalt Buy and Hold" (2008) Shiryaev, Xu and Zhou address the issue of when the best time to sell is using a "goodness index" approach. The goodness index is defined by the authors as the ratio between the excess return rate and the squared volatility rate to measure the quality of the stock ( $\alpha$ ). They concluded that the goodness index shows that the best time to hold is when  $\alpha \geq 0.5$  but when  $\alpha < 0.5$  then sell right away or short sell.

Leoni (2008) analyzed the efficiency of stop loss rules for reducing losses by conducting a research on the Monte Carlo simulated long-term behavior of a standard derivatives portfolio. The derivatives used were four types of options: Asian Call, European Call, Cash-or-Nothing and Lookback Call. Further, Leoni made the assumption that the underlying securities followed a Geometric Brownian motion (GBM). He used a six-year horizon where the stop-loss strategy was compared to the laissez-faire strategy (no trade interruption in the pre-determined time horizon). The research showed that early activation of the stop-loss strategy was due to correlations in the underlying securities and that stop-loss strategy was not effective in reducing downside risk. The derivative portfolios used had high recovery potential and since stop-loss rules ignored this aspect, the laissez-faire strategy was better suited for loss reduction.

Kaminski and Lo (2007) presented a framework for evaluating the traditional stop-loss rule using filter rules. The study investigates the question of stop-loss efficiency both analytically and empirically. Their analytical part of the study shows that the price movement processes in the underlying securities are directly affecting the efficiency of the stop-loss rules. Under a Random Walk Hypothesis the stop-loss rules show a negative expected return but for non-random walk price movement processes the stop-loss rule can stop losses and if there exists momentum or positive serial correlation in the underlying then the stop-loss rules can be value adding to the buy-and-hold strategy. The empirical part of the study shows that some stop-loss strategies improve the portfolio performance of the buy-and-hold strategy. The limitation of their study lies in the fact that they use monthly returns as input for their study. Monthly returns data has lower volatility than the data of higher frequency, leading to inaccurate estimation of the effect of stop-loss rules efficiency.

Ruggiero (2009) challenged the BH strategy. Ruggiero argued that the Buy-and-Hold strategy is useless by considering the fact that there are more daily downs than up moves and the market gain of the recent seven years has vanished in the market crash in 2008. Therefore, he suggests active portfolio management to be preferred to traditional buy-and-hold strategy.

Snorrason and Yusupoc (2009) investigated the performance of stop-loss rules compared to the buy-and-hold strategy. The evaluation criteria of whether stop-loss strategies can deliver better results are defined as return and volatility. The study is conducted on daily equity returns data for stocks listed on the OMX Stockholm 30 Index during the time period between January 1998 and April 2009 divided into holding periods of three months. The empirical results indicate that the stop-loss strategies can do better than the buy-and-hold strategy even clearer cut when compared in terms of the risk-adjusted returns.

Ngugi (2014) examined the effect of investment strategies on stock returns at the NSE. A descriptive study on closing prices of 20 companies listed at the NSE was undertaken by computing monthly mean returns for 5 technical analysis strategies and testing if the returns were significant from the monthly mean returns of BH strategy. The five (5) technical analysis used were Variable Moving Averages (VMA) 1,50; 1,150; 1,200; 2,200 and 5,150, where, 1, 2, 5 and 50, 150, 200 represented the short and long moving averages respectively and were used to generate buy and sell signals. The study concludes there was no significant difference between the mean returns generated by the technical analysis (VMA) and the mean returns derived from the BH strategy at 5% significant level and therefore the investment strategy used by an investor did not have significant effect on returns. However, the returns from the technical analysis strategies outperformed the returns from the BH strategies.

## **2.5 Summary of Literature Review**

As shown on the review of theories, Efficient Market Hypothesis and Behavioral Finance give conflicting predictions of stop-loss rules efficiency. These theories imply different

underlying price movement processes. Kaminsky and Lo (2007) concludes that the underlying price movement processes are directly determining the performance of stop-loss strategies. Therefore, we look at random walk and non-random walk processes and their implications for stop-loss rules efficiency.

Most of the empirical studies indicate that the stop-loss strategy is more efficient when cutting back on losses in a stock portfolio compared to the buy-and-hold strategy. Although stop-loss rules are widely used, the corresponding academic literature is rather limited. To date, there has been no systematic analysis of the impact of a stop-loss rule on an existing investment policy, an oversight that we remedy in this paper.

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

This chapter gives the methodology that will be used to accomplish the already established research objective. Here the research design, target population, sampling design, sample size, data collection and analysis are discussed.

### **3.2 Research Design**

Research design constitutes the blue print for collection, measurement and analysis of data (Cooper and Schindler 2001). This research study adopts a descriptive research design and focused on the Nairobi Securities Exchange. A descriptive design is used to obtain information concerning the current status of phenomena to describe what exists with respect to variables or conditions in a situation. In this study, the design seeks to establish the portfolio performance of stocks based on price movements.

### **3.3 Population**

The population of this study would comprise constituents of the NSE 20 Index. The NSE 20 Index is a price weighted index calculated as a mean of the shares of 20 public listed companies. They are selected based on a weighted market performance based on a minimum market capitalization of Kshs. 20 Million, shares traded, liquidity and turnover. They should also be blue chip companies with superior profitability and dividend record. Companies included in the NSE 20 therefore fulfill the requirement of liquidity needed for the purpose of this study. The NSE 20 is reviewed periodically to ensure that it reflects an accurate picture of market performance. According to Cooper and Schindler (2001), a population is the total collection of elements which the researcher wishes to make inferences.

### **3.4. Sample Size**

This study selected 14 stocks that have been consistently present in the NSE 20 during the study period since some of the stocks in the earlier years was of a poor quality and some

stocks did not have adequate historical information required for the study. The research period is 15 years, ranging from January 2000 to December 2014. Each year represents one holding period.

### **3.5. Data Collection**

This study will use secondary sources of data since the nature of data is quantitative. Historical time series data will be downloaded from the Nairobi Securities Exchange database. The data consists of daily closing prices from 14 stocks that constitute the NSE 20 Index during the study period of 15 years, 2000-2014. The list of companies included in the index during the study period is courtesy of the NSE.

### **3.6. Data Analysis**

The data methodology used in this study is similar to those used by Snorrason & Yusupoc (2009) that tested the performance of stop-loss rules versus the buy-and hold strategy on listed stocks at the OMX Stockholm 30 Index during the time period between January 1998 and April 2009. Data analysis is conducted by taking a long position in each of the stocks with a pre-defined stop-loss level and the same position with a buy-and-hold. The position is taken at the first trading day of a year, starting from January 2000. At the end of the year, the proceeds are reinvested. Analysis was conducted using LibreOffice Calc and R Statistical package.

#### **3.6.1 Stop-Loss Strategies**

This study employed a trailing stop-loss strategy where a stop-loss order is set at a certain percentage below the market price and then adjusted as the price rises. The tested stop-loss strategies were 10% stop-loss, 15% stop-loss, 20% stop-loss, 25% stop-loss and 30% stop-loss which are applied in one-year holding periods.

The trailing stop-loss strategies were calculated by using the logical function IF and MAX in LibreOffice Calc. Formula 1 and is an example of how a trailing stop-loss with a 10% stop-loss strategy (SL 10%) is calculated in Excel. This was then repeated for each holding period for every company's stock data.

$$P_{\max} = \text{MAX}(\text{price}_t; \text{price}_{t-1}; \text{price}_{t-k}) \quad (\text{Formula 1})$$

$$P_{sl} = \text{IF}(\text{price}_t < (0.90 * \text{MAX}(\text{price}_t ; \text{price}_{t-1} ; \text{price}_{t-k} )); \text{"SELL"} ; \text{"HOLD"}) \text{ (Formula 2)}$$

where  $P_{sl}$  is the trailing stop-loss price and  $P_{max}$  is highest price in a holding period.

Formula 1 determines the highest price so far in a holding period. It compares today's, yesterday's or all previous prices of the holding period. Then 90% of the highest price is compared to today's price in Formula 2 to see if the 10% stop-loss strategy is reached and if it is time to close the position. When a position is closed several days before the end of the holding period, the proceeds are reinvested on the same stock on the following day of trading based on the closing price and held until the position is closed again or until the end of the holding period.

At the end of each year, the average returns for each stop loss strategy are calculated for each stock to represent the performance of the stop-loss strategy based on the following formula:

$$R_{sl} = \frac{P_{sl} - P_t}{P_t} \text{ (Formula 3)}$$

where  $R_{sl}$  is the stop-loss return at time  $t$ ,  $P_{sl}$  is the trailing stop-loss price and  $P_t$  is price at beginning of the holding period or purchase price after a stop-loss limit is reached during the holding period.

The average annual returns on the stocks are then aggregated in an equally-weighted index portfolio. Returns on the portfolios are calculated for each one-year holding period.

### 3.6.2 Buy-and-Hold Strategy

The return on a BH strategy was computed assuming that the investor buys at the beginning of the holding period and sells at the end of the holding period in the study.

The study used arithmetic return to calculate returns for the BH strategy as follows:

$$R_{bh} = \frac{P_{bh} - P_t}{P_t} \text{ (Formula 4)}$$

where  $R_{bh}$  is the Buy-and-Hold price return at time  $t$ ,  $P_{bh}$  is price at the end of the holding period and  $P_t$  is price at beginning of holding period.

The annual returns on the stocks are then aggregated in an equally-weighted index portfolio. Returns on the portfolios are calculated for each one-year holding period.

### 3.6.3 Hypothesis Testing

The research question in this study was whether the stop-loss strategy was able to outperform the BH strategy. The hypothesis was formulated as follows:

$H_0$  : There was no significant difference between the mean returns generated by the stop-loss strategy (SL) and the mean returns derived from the BH strategy.

$$(H_0 : \mu_{SL} = \mu_{BH})$$

$H_1$  : There was significant difference between the mean returns generated by the stop-loss strategy (SL) and the mean returns derived from the BH strategy.

$$(H_1 : \mu_{SL} \neq \mu_{BH})$$

### 3.6.4 Test of Significance

To test the hypothesis, the study used t-test which tests the significance of the means hence,  $H_0 : \mu_{SL} = \mu_{BH}$  ,  $H_1 : \mu_{SL} \neq \mu_{BH}$ . Where  $\mu_{SL}$  is the mean return generated by the stop-loss strategy and  $\mu_{BH}$  is the mean generated by the BH strategy with significance levels of 5% for a two tailed. Rejection means that it is possible to earn return above or below the BH strategy.

## CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

### 4.1 Introduction

This section presents results of the analysis and findings of the study with reference to the objective of the study. The chapter is organized as follows; Section 4.2 gives summary statistics. Section 4.3 provides results of the data analysis and it includes relevant tables that help to explain the results of the analysis. Section 4.4 presents the summary of the findings

### 4.2 Summary Statistics

The purpose of the study was to investigate the performance of the stop-loss strategy compared to the buy-and-hold strategy at the NSE by determining if there was significant difference between the mean returns generated by the stop-loss strategy strategy and the buy-and-hold strategy. The study evaluated the annual mean returns from stop-loss strategy (SL) strategy and the annual mean returns derived from the BH strategy. The study used secondary data collected from the NSE database. The summary of the sample data is shown on Table 1;

**Table 1**

#### Sample Summary of Data

Number of Securities Analyzed As Sample	14
Number of Stop-Loss Strategies	5
Number of Buy-and-Hold Strategies	1
Number of Trading Days In Sample	3695
Average Trading Days Per Year	246
Number of Years for Annual Return	15

### 4.3 Empirical Results

The results of the Stop-Loss strategy and Buy and Hold strategy are reported in this section. Section 4.3.1 summarizes the overall market analysis between stop-loss strategy and buy and hold strategy while section 4.3.2 presents the analysis during the bearish and bullish years and 4.3.3 presents the individual company results between the stop-loss strategies and buy

and hold strategy.

#### 4.3.1 Results of Comparative Analysis between Stop-Loss Strategies and Buy-and-Hold Strategy

Table 2 summarized the results of the comparative analysis between the SL strategies and BH strategy for the entire period from January 2000 to December 2014. The table describes the strategies in column 1 as SL 10%, SL 15%, SL 20%, SL 25%, SL 30% for stop-loss strategies and BH for the Buy and Hold Strategy. Where 10%, 15%, 20%, 25%, 30% represent the stop-loss strategies. Column 2 indicates the cumulative return from each strategy. Column 3,4 and 5 shows the annual mean returns, standard deviation and variance while column 6, 7 and 8 represent the test of significance between the stop-loss strategies and the BH strategy.

**Table 2**

#### Results of Comparative Analysis between Stop-Loss and Buy-and-Hold Strategies

Strategy Description	Cumulative Return (%)	Annual Return Statistics			Test Of Significance	
		Mean Return (%)	Standard Deviation (%)	Variance (%)	P-Value	t-Stat
SL 10%	204.50	8.24	11.46	1.31	0.2143	1.2965
SL 15%	615.86	15.58	20.36	4.14	0.4410	0.7885
SL 20%	1070.26	20.89	30.97	9.59	0.6738	0.4267
SL 25%	1879.11	27.13	42.47	18.01	0.9559	0.0559
SL 30%	2386.16	30.70	50.93	25.94	0.9007	-0.1259
BH	1216.78	28.18	58.43	34.14		

The results show that only the 30% stop-loss strategy was able to outperform the cumulative and mean returns of the BH strategy. It was also noted that the 30% stop-loss strategy had a lower variance compared to the BH strategy. The annual mean return, standard deviation and variance increase as the stop-loss strategies increase. The annual statistics indicate that the mean return for BH strategy was able to outperform the 10%, 15%, 20% and 25% stop-loss strategies. However, the standard deviation and variance seemed to be highest in the BH strategy compared to all the stop-loss strategies.

Table 2 also presents the test of significance results of the means between the SL strategies

and the BH strategy at 5% significance level. The p-value of 0.2143, 0.4410, 0.6738, 0.9559, 0.9007 are greater than  $p=0.05$ . This therefore means that there was no significant difference between the means generated by the SL strategy and the BH strategy.

#### 4.3.2 Results of Comparative Analysis between Stop-Loss and Buy-and-Hold Strategies during the bearish and bullish years

To highlight the performance of the SL strategies compared to the BH strategy, the results of the bearish and bullish years of the BH strategy are presented in Table 3 and 4. The bearish years during the period of this study were recorded in the year 2000, 2001, 2008, 2009 and 2011 while the bullish years were recorded in the year 2002, 2003, 2004, 2005, 2006, 2007, 2010, 2012, 2013 and 2014. Table 3 summarizes the results of the SL and BH strategy during these years.

**Table 3**

**Results of Comparative Analysis between Stop-Loss and Buy-and-Hold Strategies during bearish years**

Strategy Description	Cumulative Return (%)	Annual Return Statistics			Test Of Significance	
		Mean Return (%)	Standard Deviation (%)	Variance (%)	P-Value	t-Stat
SL 10%	-10.95	-2.23	2.52	0.06	0.0174	-3.6691
SL 15%	-16.10	-3.39	4.01	0.16	0.0204	-3.2811
SL 20%	-19.78	-4.23	4.62	0.21	0.0247	-3.0395
SL 25%	-25.83	-5.66	5.82	0.34	0.0373	-2.6172
SL 30%	-29.84	-6.64	7.02	0.49	0.0542	-2.3001
BH	-66.63	-19.23	10.02	1.00		

The results show that all the stop-loss strategies were able to outperform the cumulative and mean returns of the BH strategy during the bearish years. It was also noted that the 10% stop-loss strategy yielded the highest return compared to the other stop-loss strategy. The annual mean return decreases as the stop-loss strategies increase while the standard deviation and variance increases as the stop-loss strategies increase. The standard deviation and variance seemed to be highest in the BH strategy compared to all the stop-loss strategies represented by the stop-loss strategies.

Table 3 also presents the test of significance results of the means between the SL strategies and the BH strategy at 5% significance level. The p-value of 0.0174, 0.0204, 0.0247 and 0.0373 representing the 10%, 15%, 20%, 25% stop-loss strategies are lower than  $p=0.05$ . This indicates that the mean returns from the stop-loss strategies during the bearish years are significantly different from the mean returns generated by the BH strategy.

**Table 4**

**Results of Comparative Analysis between Stop-Loss and Buy-and-Hold Strategies during bullish years**

Strategy Description	Cumulative Return (%)	Annual Return Statistics			Test Of Significance	
		Mean Return (%)	Standard Deviation (%)	Variance (%)	P-Value	t-Stat
SL 10%	241.96	13.50	10.46	1.09	0.0687	2.0504
SL 15%	735.26	25.06	18.38	3.38	0.1931	1.3881
SL 20%	1358.86	33.45	30.94	9.57	0.3922	0.8835
SL 25%	2568.47	43.43	43.53	18.95	0.7213	0.3629
SL 30%	3443.64	49.37	53.40	28.51	0.9209	0.1006
BH	3845.67	51.88	58.26	33.95		

The results show that the BH strategy was able to outperform the cumulative and mean returns of all the SL strategies during the bullish years. However, standard deviation and variance of the BH strategy was higher compared to the stop-loss strategy. The annual mean return, standard deviation and variance increase as the stop-loss strategies increase.

Table 4 also presents the test of significance results of the means between the SL strategies and the BH strategy at 5% significance level. The p-value of 0.06868, 0.19312, 0.39219, 0.72125 and 0.92097 are greater than  $p=0.05$ . This therefore means that there was no significant difference between the means generated by the SL strategies and the BH strategy during the bullish years.

**4.3.3 Results of Comparative Analysis between Stop-Loss and Buy-and-Hold Strategies for Individual Stocks**

The results from the comparative analysis between the SL strategies and BH strategy on

individual stocks are presented on Appendix 1 and the tests of significance between the annual mean returns for SL strategies and BH strategy are computed. Each table under Appendix 1 presents individually the results of 10%, 15%, 20%, 25% and 30% stop-loss strategies and Buy and Hold strategy with a composite of fourteen (14) stocks that constitute the NSE 20 Share Index from January 2000 to December 2014. Columns 1 show the security name and this represents the investment in the individual companies. Columns 2 shows the number of trades generated by each strategy. Columns 3 indicates the overall return from each strategy. Columns 4, 5 and 6 shows the annual mean returns, standard deviation and variance while columns 7 represent the p-values deduced from the test of significance between the annual mean for the stop-loss strategies under review and the BH strategy for each stock.

The results from the 10% stop-loss strategy indicated positive annual returns for each of the stocks. Kenol Kobil yielded the highest cumulative return, mean return and standard deviation at 481.78%, 17.04% and 39.91 respectively while Sasini yielded the lowest cumulative return and mean return at 50.64% and 3.16% with a 9.63% standard deviation. Kenya Power & Lighting had the highest number of trades at 111 trades and Bamburi Cement recorded the lowest number of trades at 60 trades during the 15 year study period between January 2000 and December 2014.

The results from the 15% stop-loss strategy indicated positive annual returns for each of the stocks. British American Tobacco Kenya yielded the highest cumulative return at 1397.21% while Centum investment yielded the highest mean return and standard deviation at 31.66% and 77.09% respectively. at 481.78%, 17.04% and 39.91 respectively. Sasini yielded the lowest cumulative return and mean return at 76.90% and 4.70%. Kenya Power & Lighting had the highest number of trades at 76 trades and Bamburi Cement recorded the lowest number of trades at 35 trades.

The results from the 20% stop-loss strategy indicated positive annual returns for each of the stocks. British American Tobacco Kenya yielded the highest cumulative and mean return at

2531.86% and 31.96% respectively while Kenya Power & Lighting yielded the lowest cumulative return, mean return and standard deviation at 115.32%, 6.87% and 19.85% respectively. Centum had the highest standard deviation at 77.94%. Kenya Airways recorded the highest number of trades at 51 trades and East African Breweries recorded the lowest number of trades at 24 trades.

The results from the 25% stop-loss strategy indicated positive annual returns for each of the stocks. British American Tobacco Kenya yielded the highest cumulative and mean return at 6189.81% and 52.07% respectively while Kenya Power & Lighting yielded the lowest cumulative return, mean return and standard deviation at 306.17%, 13.17% and 31.32% respectively. Sasini had the highest standard deviation at 114.50%. Kenya Power & Lighting had the highest number of trades at 40 trades and East African Breweries recorded the lowest number of trades at 19 trades.

The results from the 30% stop-loss strategy indicated positive annual returns for each of the stocks. British American Tobacco Kenya yielded the highest cumulative and mean return at 7571.59% and 54.30% respectively while Kenya Power yielded the lowest mean return and standard deviation at 11.52% and 31.34% respectively. Sasini had the highest standard deviation at 114.59%. Kenya Power & Lighting had the highest number of trades at 35 trades and East African Breweries recorded the lowest number of trades at 17 trades.

The BH strategy has 15 trades in total during the 15 year study period. This implies that trade was taken only at the beginning of the year and an exit at the end of the year because of the one-year holding periods. The results indicated positive annual returns for each of the stocks. British American Tobacco Kenya yielded the highest mean return and standard deviation at 151.62% and 123.13% respectively while Kenya Airways yielded the lowest cumulative return at 3.84%. Nation Media Group had the lowest standard deviation at 48.78%.

Test of significance was computed at 5% significance level for individual securities and results are presented on Columns 7 on the stop-loss strategies. There are five (5) stop-loss strategies that were tested against the BH strategy for every security during the period. The p-values results from the test of significance are presented on Tables 5, 6, 7, 8 and 9 as the P-Value column. The p-values present the probabilities that the difference between the samples is due to sampling error or not. The results reported p-values at two tail test more than 5% significant level therefore there was no significant difference between means generated by the stop-loss and buy-and-hold strategies for each of the stocks.

#### **4.4 Discussion and Interpretation of Findings**

The purpose of the study was to conduct a comparative analysis between stop-loss and buy-and-hold strategies at the NSE by determining if the stop-loss strategies outperform the buy-and-hold strategy. The stop-loss strategy was tested based on applying 10%, 15%, 20%, 25% and 30% stop-loss strategies on declining stock prices from its peak. Each of the stop-loss strategy's performance was compared with the performance of the BH strategy. The data used in the study was taken from a series of daily closing prices of fourteen (14) listed companies represented in the NSE 20 Share Index from January 2000 to December 2014. The holding period was one year. For each of the strategies the cumulative returns and the annual return statistics were computed. These annual return statistics comprised of the mean return, standard deviation and variance. Table 3 clearly supports the findings of Snorrason & Yusupoc (2009) that stop-loss strategies outperform the buy-and-hold strategy during bearish years and the findings of Ngugi (2014) that technical analysis strategies produce greater overall returns than the buy-and-hold strategy. We also find that applying a 30% stop-loss strategy to the stock portfolio was the only stop-loss strategy that out-performed the BH strategy as shown by the overall and mean return. The stop-loss strategy was highly applicable during bearish years where applying all the stop-loss strategies was able to outperform the BH strategy. However, during the bullish years the BH strategy outperformed the SL strategies.

Based on the results of the standard deviation and variance which represent the risk of the portfolio, the stop-loss strategies reduce the portfolio standard deviation and variance compared to the buy-and-hold strategy as observed on Table 2 to Table 4. This is in line with the findings of Snorrason & Yusupoc (2009), that stop-loss strategies dramatically reduce the portfolio variance at smaller limits, which is an intuitive result for stop-loss strategies applied on a portfolio generally exhibiting a positive or a negative trend

The findings of the test of significance of the mean returns generated by the BH and SL strategies, which were tested based on the following hypothesis at 5% significance level for a two-tailed test;

$H_0$  : There was no significant difference between the mean returns generated by the stop-loss strategy (SL) and the mean returns derived from the BH strategy.

$$(H_0 : \mu_{SL} = \mu_{BH})$$

$H_1$  : There was significant difference between the mean returns generated by the stop-loss strategy (SL) and the mean returns derived from the BH strategy.

$$(H_1 : \mu_{SL} \neq \mu_{BH})$$

Rejection of the null hypothesis means that it is possible to earn returns above or below the BH strategy.

Taking  $p < 0.05$  to be the significant level, Table 2 presents the results of the test of significance results which show that the p-values are greater than 0.05 for stop-loss strategy. This indicated no significant difference between the stop-loss strategy and buy-and-hold strategy. However, during the bearish years, table 3 shows that the p-values are lower than 0.05% when applying a 10% - 25% stop-loss strategies indicating that there is a significant difference between the stop-loss strategy and buy-and-hold strategy during a bear market.

## CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

### 5.1 Summary

The objective of this study was to conduct a comparative analysis of stop-loss and buy-and-hold strategies at the NSE. The study is conducted on daily stock returns data in a stock portfolio of 14 stocks represented in the NSE 20 for the time period from January 2000 to December 2014. The holding period was one year. For each of the strategies the cumulative returns and the annual return statistics were computed. These annual return statistics comprised of the mean return, standard deviation and variance. Based on the results, applying a 30% stop-loss strategy to the stock portfolio was able to outperform the buy-and-hold strategy during the study period given the other stop-loss strategies of between 10% - 25%.

To highlight the performance of the stop-loss strategies compared to the buy-and-hold strategies, a comparative analysis of the strategies was also conducted based on bullish and bearish years during the study period. The bearish years during the period of this study were recorded in the year 2000, 2001, 2008, 2009 and 2011 while the bullish years were recorded in the year 2002, 2003, 2004, 2005, 2006, 2007, 2010, 2012, 2013, 2014. The results of the comparative analysis during the bearish years showed that the stop-loss strategies highly outperformed the buy-and-hold strategy with the 10% stop-loss strategy yielding the highest return compared to the other stop-loss strategies while the during the bullish years, the buy-and-hold strategy outperformed the stop-loss strategies. This showed the efficiency of stop-loss strategies in downward trends at the NSE since the purpose of stop-loss strategies, as to be found in its name is to stop losses before they accumulate beyond a given level. The stop-loss strategies clearly call for a trade-off between loss reduction and profit maximization.

On the test of the significance of the means generated by the stop-loss strategies and buy-and-hold strategies at 5% significant level, there was no significant difference between the means.

## 5.2 Conclusion

The study conducted a comparative analysis of stop-loss and buy-and-hold strategies at the NSE from January 2000 to December 2014. In general, the results presented in the study indicate that the stop-loss strategies outperform the buy-and-hold strategies only if a 30% stop-loss strategy is applied to a stock portfolio. This means that a stock is sold if it declines by 30% from its highest price in order to minimize losses. The buy-and-hold strategy outperforms the stop-loss strategies below 30%. During the bearish years, we find strong indications of the stop-loss strategies outperforming the buy-and-hold strategy. However, during the bullish years, the buy-and hold strategy outperforms the stop-loss strategies. The stop-loss strategies perform in a more effective and consistent fashion when it comes to minimizing stock return variances. The study also recognizes that the lower stop-loss strategy the more the number of trades during a holding period. The results of the study show more or less the same effect from the annual stock returns between the stop-loss strategy and the BH strategy. There was no significant difference between the mean returns generated by the stop-loss strategies and the mean returns derived from the BH strategy. However, during the bearish years, there was a significant difference between the means generated by the stop-loss strategies and the mean returns derived from the BH strategy.

The findings are similar to the findings by Ngugi (2014), who found that technical strategies outperform the buy-and hold strategy. Snorrason & Yusupoc (2009) also found that stop-loss strategies are able to outperform the buy-and-hold strategy. This study is however conducted on a daily stock returns data of a limited number of Kenyan stocks during a 15 year period. We re-enter a position on the next day of trading after selling stock with regards to the stop-loss strategy instead of switching to a risk free asset.

Our study indicates that the stop-loss strategies can outperform the buy-and-hold strategy especially during bearish years while minimizing risk in term of the mean, cumulative returns, standard deviation and variance.

### **5.3 Recommendations to Policy and Practice**

The results in this study have some recommendations to policy and practice. The study recommends to policy the implementation of stop-loss strategies in stock portfolios so as to ensure that savings are not eroded and encourage further investments at the NSE which in turn will boost economic growth.

The study recommends to growth or momentum investors the application of stop-loss strategies to their stock portfolios to minimize on losses and improve portfolio performance rather than holding declining stocks for too long causing huge losses on the stock portfolio. In the past, most investors have been reluctant to use stop-loss strategies because they are afraid the stock might recover and go back up after exiting. The solution to that problem is to have a plan to reinstate the position when the liquidated stock shows signs of recovery or re-entering immediately after the sale if the stock still has strong fundamentals. Selling a stock doesn't mean you have given up on its prospects in the future. Selling is just a temporary measure necessary to protect capital from the increasing probability of catastrophic loss. Implementation of stop-loss strategies is costless. Commission is charged only once the stop-loss price has been reached and the stock must be sold. Stop-loss strategies allows decision making to be free from any emotional influences.

The recommended stop-loss strategy based on this study would be applying a trailing stop loss of 30% in a stock portfolio in order to limit on losses and out-perform the buy-and-hold strategy. This means that a stock is sold if it declines by 30% from its highest price then use the proceeds from the sale to reinvest on the stock immediately after the sale or before exit one ensures they have a plan to re-enter the stock.

However, stop-loss strategies will not guarantee making money in the stock market compared to the buy-and-hold strategy, one still has to make intelligent investment or trading decisions.

## **5.4 Limitations of the Study**

A major limitation was availability of data and analysis software. The NSE has made data availability and access extremely expensive and this posed difficulty of quick accessibility to the data. The unavailability of quick analysis software for the stop-loss strategies posed difficulty and took a huge amount of time during the study.

The study did not consider the effect of the transactions costs that investors incur when trading in stocks. This cost could have a huge impact on active strategies like the stop-loss strategies due to the number of times an investor trades in the market thus could have a negative impact on the overall returns.

This study relies on closing daily prices and holding periods of one year. This prevents us from determining the exact time a stop-loss condition is met, and limit our focus to those met conditions that also present at the end of a day.

This study assumed that one re-enters a position on the day after the sale of a stock regardless of the market. There was a limitation of whether to re-enter a stock or invest the proceeds from the sale on a risk-free asset during the holding period.

## **5.5 Suggestions for Further Research**

For further research, a similar research can be conducted but based on a different market and different time horizon so as to determine if the application of the stop-loss and buy-and-hold strategies is different based on different markets.

Another suggestion would be to change the theoretical starting point and use some kind of rule for entering a position. It would also be worth researching on different holding periods. How much do the results change if the proceeds are invested in a risk free asset while waiting

for the next holding period after a stop-loss has closed the position? The evaluation metric could be replaced, especially for risk.

The implication of transaction cost on the stop-loss and buy-and hold strategies presents an area for further study to determine the impact of transaction costs on the performance of the strategies.

The final suggestion would be to build a different type of portfolio, for example an index-weighted one. Other approaches to address the issue of stop-loss strategy efficiency and add to the still limited literature on stop-loss strategies should not be a problem to establish.

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## APPENDICES

### APPENDIX 1: RESULTS OF COMPARATIVE ANALYSIS BETWEEN STOP-LOSS AND BUY-AND-HOLD STRATEGIES FOR INDIVIDUAL STOCKS

**Table 5**  
**Results of 10% Stop-Loss Strategy for Individual Stocks**

Security Name	Number of Trades	Cumulative Return (%)	Annual Returns Statistics			
			Mean Return (%)	Standard Deviation (%)	Variance (%)	P-Values
ARM Cement Ltd Ord 1.00	87	265.75	9.73	13.16	1.73	0.1150
Bamburi Cement Ltd Ord 5.00	60	135.04	6.92	16.29	2.66	0.3082
Barclays Bank of Kenya Ltd Ord 0.50	74	68.97	3.81	7.70	0.59	0.4267
British American Tobacco Kenya Ltd Ord 10.00	56	440.62	13.40	20.17	4.07	0.1763
Centum Investment Co Ltd Ord 0.50	86	109.24	6.17	17.60	3.10	0.4755
CFC Stanbic of Kenya Holdings Ltd ord.5.00	78	197.98	8.44	14.98	2.24	0.2861
East African Breweries Ltd Ord 2.00	68	257.81	9.95	16.84	2.84	0.2315
KenolKobil Ltd Ord 0.05	79	481.78	17.04	39.91	15.93	0.1806
Kenya Airways Ltd Ord 5.00	98	113.04	6.54	20.27	4.11	0.5362
Kenya Commercial Bank Ltd Ord 1.00	96	181.44	7.55	9.89	0.98	0.1806
Kenya Power & Lighting Co Ltd Ord 2.50	111	53.61	3.16	7.68	0.59	0.4756
Nation Media Group Ltd Ord. 2.50	62	339.44	12.15	21.56	4.65	0.8431
Sasini Ltd Ord 1.00	109	50.64	3.16	9.63	0.93	0.4629
Standard Chartered Bank Kenya Ltd Ord 5.00	62	170.52	7.37	11.09	1.23	0.3381

**Table 6**  
**Results of 15% Stop-Loss Strategy for Individual Stocks**

Security Name	Number of Trades	Cumulative Return (%)	Annual Returns Statistics			
			Mean Return (%)	Standard Deviation (%)	Variance (%)	P-Values
ARM Cement Ltd Ord 1.00	52	805.72	17.92	23.70	5.62	0.1969
Bamburi Cement Ltd Ord 5.00	35	646.58	20.39	47.22	22.30	0.7758
Barclays Bank of Kenya Ltd Ord 0.50	46	149.82	7.07	13.73	1.88	0.5878
British American Tobacco Kenya Ltd Ord 10.00	37	1397.21	24.18	36.70	13.47	0.3069
Centum Investment Co Ltd Ord 0.50	54	1286.40	31.66	77.09	59.44	0.6631
CFC Stanbic of Kenya Holdings Ltd ord.5.00	49	587.17	16.07	26.33	6.93	0.4895
East African Breweries Ltd Ord 2.00	42	630.09	16.35	24.76	6.13	0.4165
KenolKobil Ltd Ord 0.05	56	591.06	18.94	41.68	17.37	0.8834
Kenya Airways Ltd Ord 5.00	69	243.13	13.18	42.86	18.37	0.7116
Kenya Commercial Bank Ltd Ord 1.00	65	499.86	14.62	23.46	5.50	0.3884
Kenya Power & Lighting Co Ltd Ord 2.50	76	86.80	4.83	11.42	1.30	0.5324
Nation Media Group Ltd Ord. 2.50	43	395.23	13.85	26.27	6.90	0.9417
Sasini Ltd Ord 1.00	71	76.90	4.70	14.32	2.05	0.4940
Standard Chartered Bank Kenya Ltd Ord 5.00	38	507.90	14.31	19.72	3.89	0.6191

**Table 7**  
**Results of 20% Stop-Loss Strategy for Individual Stocks**

Security Name	Number of Trades	Cumulative Return (%)	Annual Returns Statistics			
			Mean Return (%)	Standard Deviation (%)	Variance (%)	P-Values
ARM Cement Ltd Ord 1.00	35	2148.53	27.26	35.25	12.42	0.3414
Bamburi Cement Ltd Ord 5.00	29	1337.39	25.82	47.32	22.39	0.9672
Barclays Bank of Kenya Ltd Ord 0.50	32	212.56	9.89	23.34	5.45	0.7515
British American Tobacco Kenya Ltd Ord 10.00	27	2531.86	31.96	51.50	26.53	0.7515
Centum Investment Co Ltd Ord 0.50	43	1194.87	31.70	77.94	60.75	0.6640
CFC Stanbic of Kenya Holdings Ltd ord.5.00	37	985.23	21.31	35.30	12.46	0.6642
East African Breweries Ltd Ord 2.00	24	2180.65	31.37	62.12	38.59	0.9823
KenolKobil Ltd Ord 0.05	38	975.16	28.44	71.68	51.39	0.5170
Kenya Airways Ltd Ord 5.00	51	188.05	11.83	41.45	17.18	0.6775
Kenya Commercial Bank Ltd Ord 1.00	45	789.47	18.07	25.83	6.67	0.5171
Kenya Power & Lighting Co Ltd Ord 2.50	49	115.32	6.87	19.85	3.94	0.6111
Nation Media Group Ltd Ord. 2.50	31	433.28	16.41	37.24	13.87	0.9254
Sasini Ltd Ord 1.00	49	212.77	10.75	28.56	8.16	0.6265
Standard Chartered Bank Kenya Ltd Ord 5.00	30	977.69	20.78	32.95	10.86	0.9348

**Table 8**  
**Results of 25% Stop-Loss Strategy for Individual Stocks**

Security Name	Number of Trades	Cumulative Return (%)	Annual Returns Statistics			
			Mean Return (%)	Standard Deviation (%)	Variance (%)	P-Values
ARM Cement Ltd Ord 1.00	23	3548.14	34.77	49.71	24.71	0.5056
Bamburi Cement Ltd Ord 5.00	23	1648.88	32.32	66.10	43.70	0.8251
Barclays Bank of Kenya Ltd Ord 0.50	25	576.34	18.96	45.10	20.34	0.7967
British American Tobacco Kenya Ltd Ord 10.00	21	6189.81	52.07	109.45	119.79	0.8687
Centum Investment Co Ltd Ord 0.50	35	1326.36	33.42	79.54	63.27	0.6230
CFC Stanbic of Kenya Holdings Ltd ord.5.00	29	1087.35	22.56	36.84	13.58	0.7069
East African Breweries Ltd Ord 2.00	19	2496.71	32.47	61.96	38.39	0.9446
KenolKobil Ltd Ord 0.05	29	1474.63	32.94	74.31	55.22	0.4953
Kenya Airways Ltd Ord 5.00	37	276.43	13.73	38.57	14.87	0.7217
Kenya Commercial Bank Ltd Ord 1.00	37	735.74	17.52	25.46	6.48	0.4953
Kenya Power & Lighting Co Ltd Ord 2.50	40	306.17	13.17	31.32	9.81	0.8568
Nation Media Group Ltd Ord. 2.50	31	436.95	16.42	37.12	13.78	0.9248
Sasini Ltd Ord 1.00	33	584.01	32.96	114.50	131.10	0.8806
Standard Chartered Bank Kenya Ltd Ord 5.00	23	1326.10	26.58	53.13	28.23	0.8283

**Table 9**  
**Results of 30% Stop-Loss Strategy for Individual Stocks**

Security Name	Number of Trades	Cumulative Return (%)	Annual Returns Statistics			
			Mean Return (%)	Standard Deviation (%)	Variance (%)	P-Values
ARM Cement Ltd Ord 1.00	19	7024.26	50.22	97.35	94.77	0.9004
Bamburi Cement Ltd Ord 5.00	20	1718.22	32.57	65.97	43.52	0.8172
Barclays Bank of Kenya Ltd Ord 0.50	21	452.40	17.72	45.87	21.04	0.8529
British American Tobacco Kenya Ltd Ord 10.00	19	7571.59	54.30	110.48	122.05	0.9102
Centum Investment Co Ltd Ord 0.50	26	1547.02	35.55	81.00	65.61	0.5741
CFC Stanbic of Kenya Holdings Ltd ord.5.00	24	2790.98	36.44	70.93	50.31	0.8433
East African Breweries Ltd Ord 2.00	17	2273.74	31.86	62.26	38.77	0.9661
KenolKobil Ltd Ord 0.05	21	154.97	27.32	80.02	64.03	0.8081
Kenya Airways Ltd Ord 5.00	30	547.37	29.04	98.63	97.29	0.9021
Kenya Commercial Bank Ltd Ord 1.00	27	1356.50	24.48	38.57	14.88	0.8082
Kenya Power & Lighting Co Ltd Ord 2.50	35	221.47	11.52	31.34	9.82	0.7945
Nation Media Group Ltd Ord. 2.50	24	429.53	17.23	40.09	16.07	0.8881
Sasini Ltd Ord 1.00	28	779.04	35.34	114.59	131.31	0.8372
Standard Chartered Bank Kenya Ltd Ord 5.00	22	1238.36	26.18	53.39	28.51	0.8438

**Table 10**  
**Results of Buy and Hold Strategy for Individual Stocks**

Security Name	Number of Trades	Cumulative Return (%)	Annual Returns Statistics			P-Values
			Mean Return (%)	Standard Deviation (%)	Variance (%)	
ARM Cement Ltd Ord 1.00	15	7560.53	54.85	103.37	106.84	-
Bamburi Cement Ltd Ord 5.00	15	444.92	26.73	70.97	50.37	-
Barclays Bank of Kenya Ltd Ord 0.50	15	177.91	14.45	49.79	24.79	-
British American Tobacco Kenya Ltd Ord 10.00	15	6853.40	151.62	123.13	59.16	-
Centum Investment Co Ltd Ord 0.50	15	109.35	19.81	70.09	49.13	-
CFC Stanbic of Kenya Holdings Ltd ord.5.00	15	653.41	31.02	77.65	60.30	-
East African Breweries Ltd Ord 2.00	15	1915.13	30.87	62.95	39.63	-
KenolKobil Ltd Ord 0.05	15	33.67	23.86	82.03	67.29	-
Kenya Airways Ltd Ord 5.00	15	3.84	24.37	107.18	114.87	-
Kenya Commercial Bank Ltd Ord 1.00	15	1180.99	28.89	58.00	33.64	-
Kenya Power & Lighting Co Ltd Ord 2.50	15	22.59	16.88	72.08	51.95	-
Nation Media Group Ltd Ord. 2.50	15	121.74	14.91	48.78	23.79	-
Sasini Ltd Ord 1.00	15	26.35	26.49	119.38	142.52	-
Standard Chartered Bank Kenya Ltd Ord 5.00	15	517.15	22.18	56.90	32.38	-

**APPENDIX 2: LISTED COMPANIES AT THE NSE AS AT 31 ST DECEMBER 2014**

	<b>AGRICULTURAL</b>
1	Eaagads Ltd
2	Kakuzi Ltd
3	Kapchorua Tea Co. Ltd
4	The Limuru Tea Co. Ltd
5	Rea Vipingo Plantations Ltd
6	Sasini Ltd
7	Williamson Tea Kenya Ltd
	<b>AUTOMOBILES &amp; ACCESSORIES</b>
8	Car & General (K) Ltd
9	Marshalls (E.A.) Ltd
10	Sameer Africa Ltd
	<b>BANKING</b>
11	Barclays Bank of Kenya Ltd
12	CFC Stanbic of Kenya Holdings Ltd
13	Diamond Trust Bank Kenya Ltd
14	Equity Bank Ltd
15	Housing Finance Co. Kenya Ltd
16	I&M Holdings Ltd
17	Kenya Commercial Bank Ltd
18	National Bank of Kenya Ltd
19	NIC Bank Ltd
20	Standard Chartered Bank Kenya Ltd
21	The Co-operative Bank of Kenya Ltd
	<b>COMMERCIAL AND SERVICES</b>
22	Atlas Development and Support Services
23	Express Kenya Ltd
24	Hutchings Biemer Ltd
25	Kenya Airways Ltd
26	Longhorn Kenya Ltd
27	Nation Media Group Ltd
28	Scangroup Ltd
29	Standard Group Ltd

30	TPS Eastern Africa Ltd
31	Uchumi Supermarket Ltd
	<b>CONSTRUCTION &amp; ALLIED</b>
32	ARM Cement Ltd
33	Bamburi Cement Ltd
34	Crown Berger Ltd
35	E.A.Cables Ltd
36	E.A.Portland Cement Co. Ltd
	<b>ENERGY &amp; PETROLEUM</b>
37	KenGen Co. Ltd
38	KenolKobil Ltd
39	Kenya Power & Lighting Co Ltd
40	Total Kenya Ltd
41	Umeme Ltd
	<b>INSURANCE</b>
42	British-American Investments Co.(Kenya) Ltd
43	CIC Insurance Group Ltd
44	Jubilee Holdings Ltd
45	Kenya Re Insurance Corporation Ltd
46	Liberty Kenya Holdings Ltd
47	Pan Africa Insurance Holdings Ltd
	<b>INVESTMENT</b>
48	Centum Investment Co Ltd
49	Home Afrika Ltd
50	Kurwitu Ventures
51	Olympia Capital Holdings Ltd
52	Trans-Century Ltd
	<b>INVESTMENT SERVICES</b>
53	Nairobi Securities Exchange Ltd
	<b>MANUFACTURING &amp; ALLIED</b>
54	A.Baumann & Co Ltd
55	B.O.C Kenya Ltd
56	British American Tobacco Kenya Ltd
57	Carbacid Investments Ltd
58	East African Breweries Ltd
59	Eveready East Africa Ltd

60	Flame Tree Group Holdings Ltd
61	Kenya Orchards Ltd
62	Mumias Sugar Co. Ltd
63	Unga Group Ltd
	<b>TELECOMMUNICATION &amp; TECHNOLOGY</b>
64	Safaricom Ltd

Source: - <https://www.nse.co.ke/listed-companies/list.html?start=50>

### **APPENDIX 3: SAMPLE OF THE STUDY**

1	ARM Cement Ltd
2	Bamburi Cement Ltd
3	Barclays Bank of Kenya Ltd
4	British American Tobacco Kenya Ltd
5	Centum Investment Co Ltd
6	CFC Stanbic of Kenya Holdings Ltd
7	East African Breweries Ltd
8	KenolKobil Ltd
9	Kenya Airways Ltd
10	Kenya Commercial Bank Ltd
11	Kenya Power & Lighting Co Ltd
12	Nation Media Group Ltd
13	Sasini Ltd
14	Standard Chartered Bank Kenya Ltd